3.0 ELMENDORF AIR FORCE BASE AFFECTED ENVIRONMENT AND CONSEQUENCES

This chapter contains both the affected environment and environmental consequences analysis for all facility options to implement the Proposed Action at Elmendorf Air Force Base (AFB). The National Environmental Policy Act (NEPA) requires that the analysis address those areas and the components of the environment with the potential to be affected; locations and resources with no potential to be affected need not be analyzed.

Each resource discussion begins with a definition including resource attributes and any applicable regulations. The expected geographic scope of any potential consequences is identified as the Region of Influence (ROI). For most resources in this chapter, the ROI is defined as the boundaries of Elmendorf AFB. For some resources (such as Noise, Air Quality, and Socioeconomics), the ROI extends over a larger jurisdiction unique to the resource.

The *Existing Condition* of each relevant environmental resource is described to give the public and agency decision-makers a meaningful point from which they can compare potential future environmental, social, and economic effects. The *Environmental Consequences* section for each resource considers the direct and indirect effects of the facility construction options described in Chapter 2.0, including the No Action Alternative. Cumulative effects are discussed in Chapter 5.0.

3.1 Airspace Management and Air Traffic Control

The affected environment or ROI for aircraft operations at Elmendorf AFB includes the base and the airspace surrounding the airfield. This section explains airspace management and Section 3.1.1.2 presents the consequences of the proposed F-22A beddown.

3.1.1 Definition of Elmendorf AFB Airspace Management and Air Traffic Control

Airspace management and air traffic control is defined as the direction, control, and handling of flight operations in the "navigable airspace" that overlies the geopolitical borders of the United States (U.S.) and its territories. "Navigable airspace" is airspace above the minimum altitudes of flight prescribed by regulations under United States Code (USC) Title 49, Subtitle VII, Part A, and includes airspace needed to ensure safety in the takeoff and landing of aircraft, as defined in Federal Aviation Administration (FAA) Order 7400.2E (49 USC). This navigable airspace is a limited natural resource that Congress has charged the FAA to administer in the public interest as necessary to ensure the safety of aircraft and its efficient use (FAA Order 7400.2E 2000).

Training airspace or Special Use Airspace (SUA) identified for military and other governmental activities is charted and published by the FAA. This airspace is discussed in Section 4.1.2.

3.1.2 Existing Conditions

Elmendorf AFB manages airspace in accordance with processes and procedures detailed in Air Force Instruction (AFI) 13-201, *Air Force Airspace Management*. AFI 13-201 implements Air Force Planning Document 13-2, *Air Traffic Control, Airspace, Airfield, and Range Management*, and Department of Defense (DoD) Directive 5030.19, *DoD Responsibilities on Federal Aviation and*

National Airspace System Matters. This AFI addresses the aeronautical matters governing the efficient planning, acquisition, use, and management of airspace required to support United States Air Force (Air Force) flight operations (Air Force 2001b).

Airspace supporting operations at Elmendorf AFB is within the Anchorage Alaska Terminal Area (AATA). The AATA is divided into six segments: the International Segment; the Seward Highway Segment; the Lake Hood Segment; the Merrill Segment; the Elmendorf Segment; and, the Bryant Segment (3rd Wing [3 WG] 2004).

Class D controlled airspace has been established around Elmendorf AFB. This controlled airspace abuts the Class C controlled airspace around Anchorage International Airport to the southwest, and the Restricted Area R-2203 over Fort Richardson to the northeast. While the Elmendorf AFB control tower manages arrivals and departures at Elmendorf AFB, Anchorage Approach Control has overall responsibility for traffic management within the AATA. Detailed processes, procedures, and altitude separation requirements that must be followed by military and civilian pilots operating within the AATA are published in aeronautical charts.

Aircraft at Elmendorf AFB have flown in this airspace for more than 60 years without conflict with civil or commercial aviation. While the ATAA is congested, continued coordination between Elmendorf AFB Air Traffic Control (ATC) and Anchorage Approach Control minimizes conflicts.

3.1.3 Environmental Consequences

3.1.3.1 Option A

Option A would continue to have approximately 50,000 operations per year at Elmendorf. The proposed beddown of F-22A aircraft would result in a reduction of approximately 10 daily flying operations at Elmendorf (4 percent) as compared to current conditions. This minor reduction would not result in any modifications to Elmendorf Tower or AATA procedures

Elmendorf AFB actively supports AATA management of the regional airspace. That support includes transient military aircraft such as this C-5.

Elmendorf AFB control tower coordinates closely with the AATA to support military and civil aviation in the region. An example of this cooperation was the tight turning pattern applied to the 7,500 foot north-south runway while the 10,000 foot main runway was resurfaced during 2005. This pattern, instituted by Elmendorf Tower, reduced any potential for encroachment on Merrill Field, south of the runway. Under the proposed beddown of F-22A aircraft, Elmendorf AFB would continue to work closely with AATA. The overall effect would be no discernible impact to airspace management and ATC.

3.1.3.2 Option B

AATA and Elmendorf AFB responsibilities and capabilities would be the same as those described for Option A. No discernible impacts would be expected with Option B.

3.1.3.3 Option C

AATA and Elmendorf AFB responsibilities and capabilities would be the same as those described for Option A. No discernible impacts would be expected with Option C.

3.1.3.4 No Action

No Action would continue to have F-15C and F-15E aircraft using the AATA airspace for the foreseeable future. This would not place any consequences on airspace management or ATC.

3.2 Noise

3.2.1 Definition of Elmendorf AFB Noise

Noise is considered to be unwanted sound that interferes with normal activities or otherwise diminishes the quality of the environment. The noise may be intermittent or continuous, steady or impulsive. It may be stationary or transient. Stationary sources are normally related to specific land uses, e.g., housing tracts or industrial plants. Transient noise sources move through the environment, either along established paths (e.g., highways, railroads), or randomly (e.g., an aircraft flying in a block of training airspace such as a Military Operations Area [MOA]). There is wide diversity in responses to noise that not only vary according to the type of noise and the characteristics of the sound source, but also according to the sensitivity and expectations of the receptor, the time of day, and the distance between the noise source (e.g., an aircraft) and the receptor (e.g., a person or animal).

Noise annoyance is further described in Appendix D, Aircraft Noise Analysis and Airspace Operations.

The physical characteristics of noise, or sound, include its *intensity*, *frequency*, and *duration*. Sound is created by acoustic energy, which produces minute pressure waves that travel through a medium, like air, and are sensed by the eardrum. This may be likened to the ripples in water that would be produced when a stone is dropped into it. As the acoustic energy increases, the intensity or amplitude of these pressure waves increase, and the ear senses louder noise. Sound intensity varies widely (from a soft whisper to a jet engine) and is measured on a logarithmic scale to accommodate this wide range. The use of logarithms is nothing more than a mathematical tool that simplifies dealing with very large and very small numbers. For example, the logarithm of the number 1,000,000 is 6, and the logarithm of the number 0.000001 is -6 (minus 6). Obviously, as more zeros are added before or after the decimal point, converting these numbers to their logarithms greatly simplifies calculations that use these numbers.

The frequency of sound is measured in cycles per second, or hertz (Hz). This measurement reflects the number of times per second the air vibrates from the acoustic energy. Low frequency sounds are heard as rumbles or roars, and high frequency sounds are heard as screeches. Sound measurement is further refined through the use of "A-weighting." The normal human ear can detect sounds that range in frequency from about 20 Hz to 15,000 Hz. However, all sounds throughout this range are not heard equally well. Therefore, through internal electronic circuitry, some sound meters are calibrated to emphasize frequencies in the 1,000 to 4,000 Hz range. The human ear is most sensitive to frequencies in this range, and sounds measured with these instruments are termed "A-weighted," and are shown in terms of A-weighted decibels.

The duration of a noise event, and the number of times noise events occur are also important considerations in assessing noise impacts.

The word "metric" is used to describe a standard of measurement. As used in environmental noise analysis, there are many different types of noise metrics. Each metric has a different physical meaning or interpretation and each metric was developed by researchers attempting to represent the effects of environmental noise.

The metrics that support the assessment of noise from aircraft operations associated with the proposal include the maximum sound level (L_{max}), the Sound Exposure Level (SEL), and Day-Night Average Sound Levels (L_{dn}). Each metric represents a "tier" for quantifying the noise environment, and is briefly discussed below. Section 4.2.1 and Appendix D also contain noise metric definitions.

Maximum Sound Level

L_{max} defines peak noise levels. L_{max} is the highest sound level measured during a single noise event (e.g., an aircraft overflight), and is the sound actually heard by a person on the ground. For an observer, the noise level starts at the ambient noise level, rises up to the maximum level as the aircraft flies closest to the observer, and returns to the ambient level as the aircraft recedes into the distance.

Sound Exposure Level

L_{max} alone may not represent how intrusive an aircraft noise event is because it does not consider the length of time that the noise persists. The SEL metric combines both of these characteristics into a single measure. It is important to note, however, that SEL does not directly represent the sound level heard at any given time, but rather provides a measure of the total exposure of the entire event. Its value represents all of the acoustic energy associated with the event, as though it was present for one second. Therefore, for sound events that last longer than one second, the SEL value will be higher than the L_{max} value. The SEL value is important because it is the value used to calculate other time-averaged noise metrics.

Time-Averaged Cumulative Day-Night Average Noise Metrics

The number of times aircraft noise events occur during given periods is also an important consideration in assessing noise impacts. The "cumulative" noise metrics that support the analysis of multiple time-varying aircraft events are L_{dn} and the Onset-Rate Adjusted Monthly Day-Night Average Sound Level (L_{dnmr}).

These metrics sum the individual noise events and average the resulting level over a specified length of time. Thus, it is a composite metric representing the maximum noise levels, the duration of the events, the number of events that occur, and the time of day during which they occur. These metrics add a 10 decibel (dB) penalty to those events that occur between 10:00 p.m. and 7:00 a.m. to account for the increased intrusiveness of noise events that occur at night when ambient noise levels are normally lower than during the daytime. These cumulative metric do not represent the variations in the sound level heard. Nevertheless, they do provide an excellent measure for comparing environmental noise exposures when there are multiple noise events to be considered.

Using measured sound levels as a basis, the Air Force developed several computer programs to calculate noise levels resulting from aircraft operations. Sound levels calculated by these programs have been extensively validated against measured data, and have been proven to be highly accurate.

In this document, the sound levels calculated for aircraft operations around Elmendorf AFB are all daily L_{dn}. L_{dn} metrics are the preferred noise metrics of the Department of Housing and Urban Development, the U.S. Department of Transportation, the FAA, the U.S. Environmental Protection Agency (USEPA), and the Veteran's Administration.

L_{dn} may be thought of as the continuous or cumulative A-weighted sound level which would be present if all of the variations in sound level which occur over the given period were smoothed out so as to contain the same total sound energy. While L_{dn} does provide a single measure of overall noise impact, it is fully recognized that it does not provide specific information on the number of noise events or the specific individual sound levels which do occur. For example, an L_{dn} of 65 dB could result from a very few noisy events, or a large number of less noisy events. Although it does not represent the sound level heard at any one particular time, it does represent the total sound exposure. Scientific studies and social surveys have found the L_{dn} to be the best measure to assess levels of community annoyance associated with all types of environmental noise. Therefore, its use is endorsed by the scientific community and governmental agencies (American National Standards Institute 1980, 1988; USEPA 1974; Federal Interagency Commission on Urban Noise 1980; Federal Interagency Commission on Noise 1992).

The ROI for noise consists of the area immediately surrounding Elmendorf AFB, as identified by the L_{dn} 65 noise contour.

3.2.2 Existing Conditions

Elmendorf AFB has supported a variety of aircraft and operations since its inception in the early 1940s. Aircraft and associated missions have ranged from World War II bombers and cargo aircraft to the current suite of 42 Primary Aircraft Inventory (PAI) F-15Cs, 18 F-15Es, 2 E-3s, 3 C-12s, and 16 C-130s. The variety of missions and aircraft over the years has formed the shape and extent of areas affected by aircraft operations and associated noise.

L_{DN}, or Day-Night Average Sound Level, is the most widely accepted metric for evaluation of noise around airfields.

Baseline noise levels, expressed as L_{dn}, were modeled based on aircraft types, runway use patterns, engine power settings, altitude profiles, flight track locations, airspeed, and other factors. To identify the areas affected by noise levels around the base, the Air Force's NOISEMAP program is used to calculate noise levels and generate noise contours. Then, the Air Force's NMPlot program is used to graphically plot these contours on a background map in 5 dB increments from 65 L_{dn} to 85 L_{dn}. In keeping with Elmendorf AFB noise abatement programs, no sorties by fighter aircraft are assumed to occur between 10 p.m. and 7 a.m. for normal training activity. Noise levels associated with current conditions are depicted in Figure 3.2-1.

Noise levels of 65 L_{dn} or greater mostly affect lands on Elmendorf AFB or Fort Richardson. Off base areas affected by noise levels of 65 L_{dn} or higher occur over water and, to a small degree, in the industrial Port of Anchorage. Table 3.2-1 details the extent of these areas exposed to elevated noise levels. Section 3.8 describes the land use implications of these noise levels.

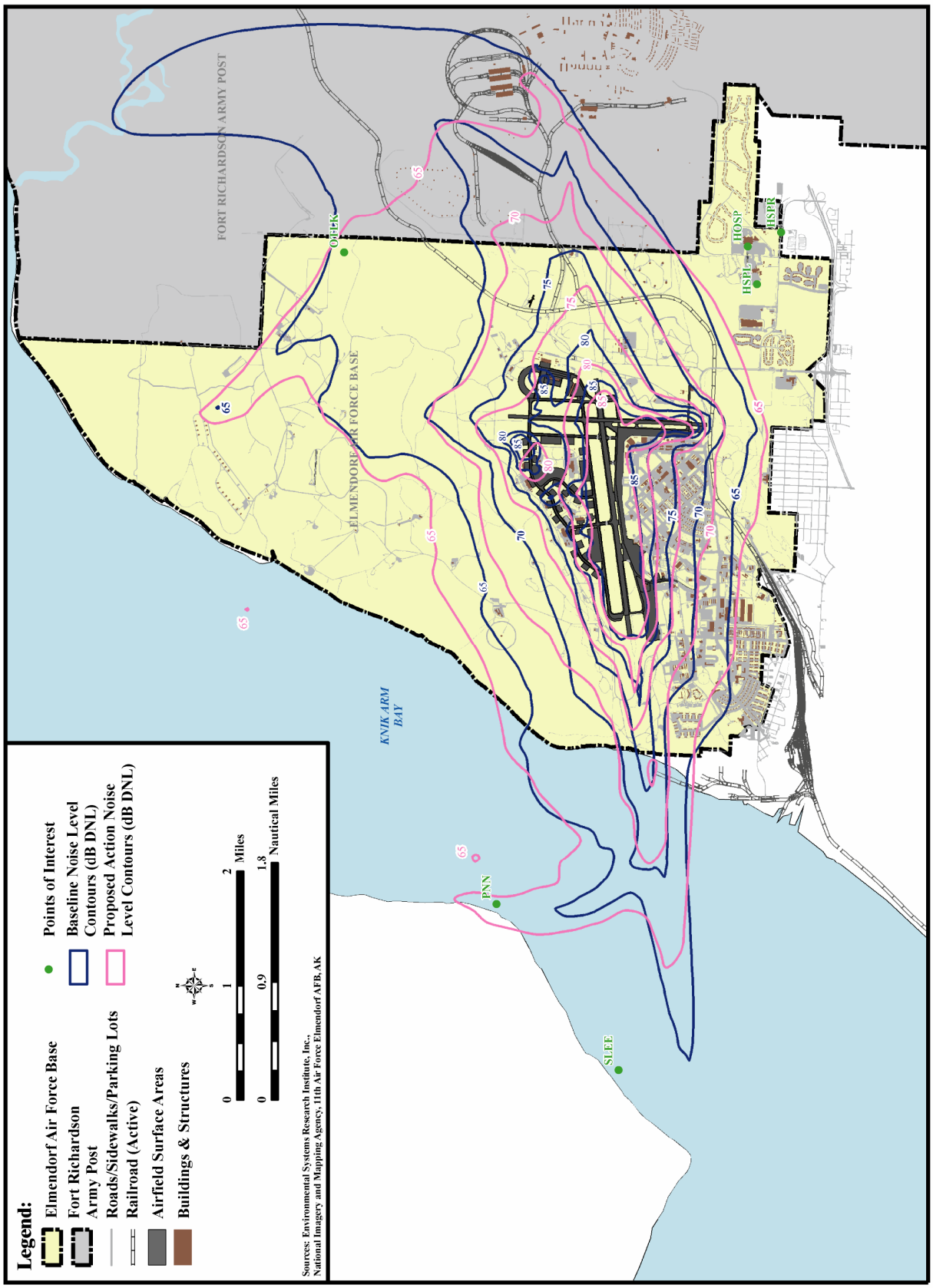


Figure 3.2-1. Baseline and Proposed Action Noise Contours

Table 3.2-1. Land Area Noise Exposures Under Current Conditions

	Geographic Area (in Acres) Exposed to Indicated Noise Levels (in L_{DN})					
Location	*65-70*	*70-75*	*75-80*	*80-85*	*>85*	*Total*
Elmendorf AFB	3,345.5	1,711.6	1,208.9	613.4	663.8	7,543.2
Fort Richardson	3,125.9	600.6	--	--	--	3,726.5
Over Water	911.2	181.3	20.0	--	--	1,112.5
Port of Anchorage	24.2	6.5	2.5	--	--	33.2
Total	7,406.6	2,500.0	1,231.4	613.4	663.8	12,415.4

Source: Wasmer and Maunsell 2005.

Aircraft at Elmendorf AFB generally operate according to established flight paths and overfly the same areas surrounding the base. Military aircraft are designed for performance and the engines are noisy. Elmendorf AFB employs a quiet-hours program in which, barring a national emergency or a major exercise, fighter aircraft operations (take off and landing patterns as well as engine run-ups) are avoided after 10:00 p.m. and before 7:00 a.m. every day of the week. At Elmendorf AFB, noise exposure from airfield operations typically occur beneath main approach and departure corridors along both runways and in areas immediately adjacent to parking ramps and aircraft staging areas.

Noise due to construction and maintenance equipment, as well as general vehicle traffic is a common, ongoing occurrence in the base environment. Existing military construction projects are currently in progress at Elmendorf AFB. Trucks, as well as heavy equipment, are usually found in the base environment on a daily basis to support these existing facility and infrastructure upgrades.

3.2.3 Environmental Consequences

Based on the Langley AFB experience with operational F-22A aircraft, a set of flight operations assumptions has been incorporated into noise modeling for the F-22A operations at Elmendorf AFB. These F-22A flight operation assumptions are:

Public scoping concerns regarding noise included any difference between noise generation of the F-22A compared to the F-15C or F-15E.

- Current noise abatements procedures that exclude normal fighter operations between 10 p.m. and 7 a.m. are assumed to continue.
- F-22A afterburner takeoff profiles are based on experience with operational aircraft at Langley AFB. This results in a steeper climb-out for F-22A than for F-15C or F-15E aircraft.
- F-22A afterburner departures represent approximately 2 percent of F-22A departures based on experience with operational aircraft.
- F-22A MIL-Power departures are based on data gathered by the Elmendorf F-22A Integration Office from F-22A pilots at Langley AFB. Climb-rates and throttle settings are provided for takeoffs under visual meteorological conditions (VMC – 80 percent of the time) and instrument meteorological conditions (IMC – 20 percent of the time).

Table 3.2-2 compares the total area, in acres, exposed to each noise contour. Data reflect and compare current and projected noise exposure. Figure 3.2-1 shows the noise contours.

Table 3.2-2. Current and Projected Areas Exposed to Noise Levels Under Full Squadron Size

Location	*Condition*	Geographic Area (In Acres) Exposed to Indicated Noise Levels (In L_{DN})					
		65-70	*70-75*	*75-80*	*80-85*	*>85*	*Total*
Elmendorf AFB	Current	3,345.5	1,711.6	1,208.9	613.4	663.8	7,543.2
	Proposed	4,161.3	2,072.1	1,205.6	516.8	563.4	8,519.2
	Change	+815.8	+360.5	-3.2	-96.7	-100.4	+976.0
Fort Richardson	Current	3,125.9	600.6	0	0	0	3,726.5
	Proposed	1,151.6	136.7	0	0	0	1,288.4
	Change	-1,974.3	-4,463.9	0	0	0	-2,438.1
Over Water	Current	911.2	181.3	20.0	0	0	1,112.5
	Proposed	1,173.5	188.6	7.7	0	0	1,369.8
	Change	+262.3	+7.3	-12.3	0	0	+257.2
Port of Anchorage	Current	24.2	6.5	2.5	0	0	33.2
	Proposed	29.4	11.1	0.5	0	0	41.0
	Change	+5.2	+4.6	-2.0	0	0	+7.8
Port MacKenzie Area	Current	0	0	0	0	0	0
	Proposed	23.5	0	0	0	0	23.5
	Change	+23.5	0	0	0	0	+23.5

Source: Wasmer and Maunsell 2005.

The total geographic area exposed to L_{dn} 65 or more would be projected to decrease from 12,415.r acres under current conditions to 11,242 acres under the proposed beddown. The decrease of 1,173.6 acres represents a 9.5 percent reduction.

No off base civilian communities would be under the Proposed Action 65 dB noise contour. Satellite imagery demonstrates that the 23.5 acres in the Port MacKenzie area are vacant or in industrial uses. The Port of Anchorage is a compatible land use under the projected noise contours.

The reduction in the 65 L_{dn} contour on Fort Richardson results from the F-22A departure profiles reflecting the Langley AFB experience. The growth of the 65 L_{dn} contours over the Knik Arm west of the base is associated with the F-22A aircraft being held at relatively low approach altitudes on confined flight tracks by Anchorage Approach Control to deconflict traffic into and out of the several airports in the vicinity.

While the basis of the proposal involves the stationing of the F-22A aircraft at Elmendorf AFB, there are some variations pertaining to the development of the supporting infrastructure. These are addressed below.

3.2.3.1 Option A

Short-term noise increases due to construction and renovation, as well as infrastructure (storm water and electric lines) installment and realignment would occur. Construction occurs in stages; the earlier stage entails trucks, bulldozers, and other heavy construction equipment for the major construction projects (e.g., hangars, aircraft parking facilities, apron). This stage of construction would be temporary and isolated to those areas where construction would occur. Later stages of construction involve less heavy equipment, are also temporary, and occur in the same areas. Most of these projects would be undertaken adjacent to the flight line and occupy industrial areas, and would be isolated from any off base communities. In addition, construction would take place during daylight hours and would follow best management practices (BMPs) to minimize noise to any off base receptors. Construction noise would be contained within base environs since most heavy construction would occur near the flight line, where noise would be compatible with ongoing activities.

3.2.3.2 Option B

Under Option B, the number of annual sorties would be the same as those described in Option A; thus, the noise effects are identical. Option B includes a variation on the construction, renovation, and infrastructure improvement projects. The consequences to the noise environment would be similar to those described for Option A.

3.2.3.3 Option C

Option C is identical to Options A and B for flight activities, thus the consequences for noise would be as described in Section 3.2.3.1. Option C presents a variation on facility construction, however the consequences to the noise environment from construction would be similar to those described for Option A.

3.2.3.4 No Action

Under the No Action Alternative, the aircraft conversion would not occur. Noise levels around the airfield would remain as discussed in Section 3.1.

3.3 Safety

3.3.1 Definition of Elmendorf AFB Safety

This section addresses ground, flight, and explosive safety associated with operations conducted by the 3 WG at Elmendorf AFB. These operations include activities and operations conducted on the base itself, as well as training conducted in regional military training airspace. Ground safety considers issues associated with operations and maintenance activities that support base operations, including fire response. Flight safety considers aircraft flight risks. Explosive safety discusses the management and use of ordnance or munitions associated with airbase operations and training activities conducted in various elements of training airspace.

The safety ROI includes Elmendorf AFB and environs. Safety in military training airspace used by aircrews from the 3 WG is discussed in Section 4.3.

3.3.2 Existing Conditions

3.3.2.1 Ground Safety

Ongoing operations and maintenance activities conducted by the 3 WG are performed in accordance with applicable Air Force safety regulations, published Air Force Technical Orders, and standards prescribed by Air Force Occupational Safety and Health requirements. In 2005, the 3 WG experienced a Ground Operations fatality. While performing maintenance on an F-15 aircraft, a technician went to pick up a canopy safety strut, and fell from the maintenance platform to the hangar floor (personal communication, Madara 2005).

The 3 WG fire department provides fire and crash response at Elmendorf AFB. The unit has a sufficient number of trained and qualified personnel, and possesses all equipment necessary to respond to aircraft accidents and structure fires. There are no response-equipment shortfalls. There are several facilities, including aircraft hangars, which have documented fire safety deficiencies. These deficiencies primarily involve the need to either install or upgrade fire suppression systems (personal communication, Madara 2005).

To minimize the results of a potential accident involving aircraft operating from Elmendorf AFB, Clear Zones (CZs), Accident Potential Zones (APZs), and safety zones have been established around the airfield. In developing these zones, Elmendorf AFB is considered to have a Class B runway. These zones are shown in Figure 3.3-1 from the 2005 Base General Plan which also includes noise contours from that plan. Within clear and safety zones, construction is either prohibited (CZs) or limited in terms of placement and height (safety zones). Areas around the airfield where experience has shown most aircraft accidents occur are designated as APZs.

The CZ is an area 3,000 feet wide by 3,000 feet long for both Class A and Class B runways, and is located at the immediate end of the runway. The accident potential in this area is so high that no building is allowed. For safety reasons, the military is authorized to purchase the land for these areas if not already part of the installation (Air Force Civil Engineer Support Agency, U.S. Army Corps of Engineers [USACE], and Naval Facilities Engineering Command 2001).

APZ I is less critical than the CZ, but still possess significant potential for accidents. This 3,000-foot wide by 5,000 foot-long area located just beyond the CZ, has land use compatibility guidelines that allow a variety of industrial, manufacturing, transportation, communication, utilities, wholesale trade, open space and agricultural uses. Uses that concentrate people in small areas are not compatible (Air Force Civil Engineer Support Agency, USACE, and Naval Facilities Engineering Command 2001).

APZ II is less critical than APZ I, but still poses potential for accidents. APZ II is 3,000 feet wide and extends 7,000 feet beyond APZ I. Compatible land uses include those of APZ I, as well as low density single family residential, and those personal and business services and commercial retail trade uses with low intensity or scale of operation. High density functions such as multistory buildings, places of assembly (e.g., theaters, schools, churches and restaurants) and high density offices uses are not considered compatible (Air Force Civil Engineer Support Agency, USACE, and Naval Facilities Engineering Command 2001).

Unified Facilities Criteria 3-260-01 also specifies requirements for imaginary surfaces on and around the runway. These criteria specify encroachment-free standards along and on either

side of the runway (Air Force Civil Engineer Support Agency, USACE, and Naval Facilities Engineering Command 2001).

Currently, Elmendorf AFB is operating under waivers and exemptions to these criteria. These are detailed in Table 3.3-1.

Table 3.3-1. Airfield Waivers and Exemptions

	Number For Specified Types		
Type	*Clear Zone*	*Accident Potential Zone*	*Other*
Waivers	8	1	27
Exemptions	2	--	7

Source: Elmendorf AFB 2005; Personal communication, Madara 2005.

3.3.2.2 Flight Safety

The primary public concern with regard to flight safety is the potential for aircraft accidents. Such mishaps may occur as a result of weather-related accidents, mechanical failure, pilot error, mid-air collisions, collisions with manmade structures or terrain, or bird-aircraft collisions. Flight risks apply to all aircraft; they are not limited to the military.

The Air Force defines four major categories of aircraft mishaps: Classes A, B, C, and E, which includes High Accident Potential (HAP). Class A mishaps result in a loss of life, permanent total disability, a total cost in excess of $1 million, or destruction of an aircraft. Class B mishaps result in total costs of more than $200,000, but less than $1 million, result in permanent partial disability or inpatient hospitalization of three or more personnel. Class C mishaps involve reportable damage of more than $20,000, but less than $200,000; an injury resulting in any loss of time from work beyond the day or shift on which it occurred, or occupational illness that causes loss of time from work at any time; or an occupational injury or illness resulting in permanent change of job. HAP events are any hazardous occurrence that has a high potential for becoming a mishap. Class C mishaps and HAP, the most common types of accidents, represent relatively unimportant incidents because they generally involve minor damage and injuries, and rarely affect property or the public (Air Force 2004b). This Environmental Assessment (EA) will focus on Class A mishaps because of their potentially catastrophic results.

Based on historical data on mishaps at all installations, and under all conditions of flight, the military services calculate Class A mishap rates per 100,000 flying hours for each type of aircraft in the inventory. It should be noted that these mishap rates do not consider combat losses due to enemy action. In evaluating this information, it should be emphasized that data presented are only statistically predictive. The actual causes of mishaps are due to many factors, not simply the amount of flying time of the aircraft.

Mishap rates are statistically assessed as an occurrence rate per 100,000 flying hours. Figure 3.3-2 reflects the cumulative annual Class A mishap rates of the F-15 for the past 30 years. As the aircraft, the pilots who fly it, and the technicians who maintain it mature over time, mishap rates are reduced and maintain a relatively constant level.

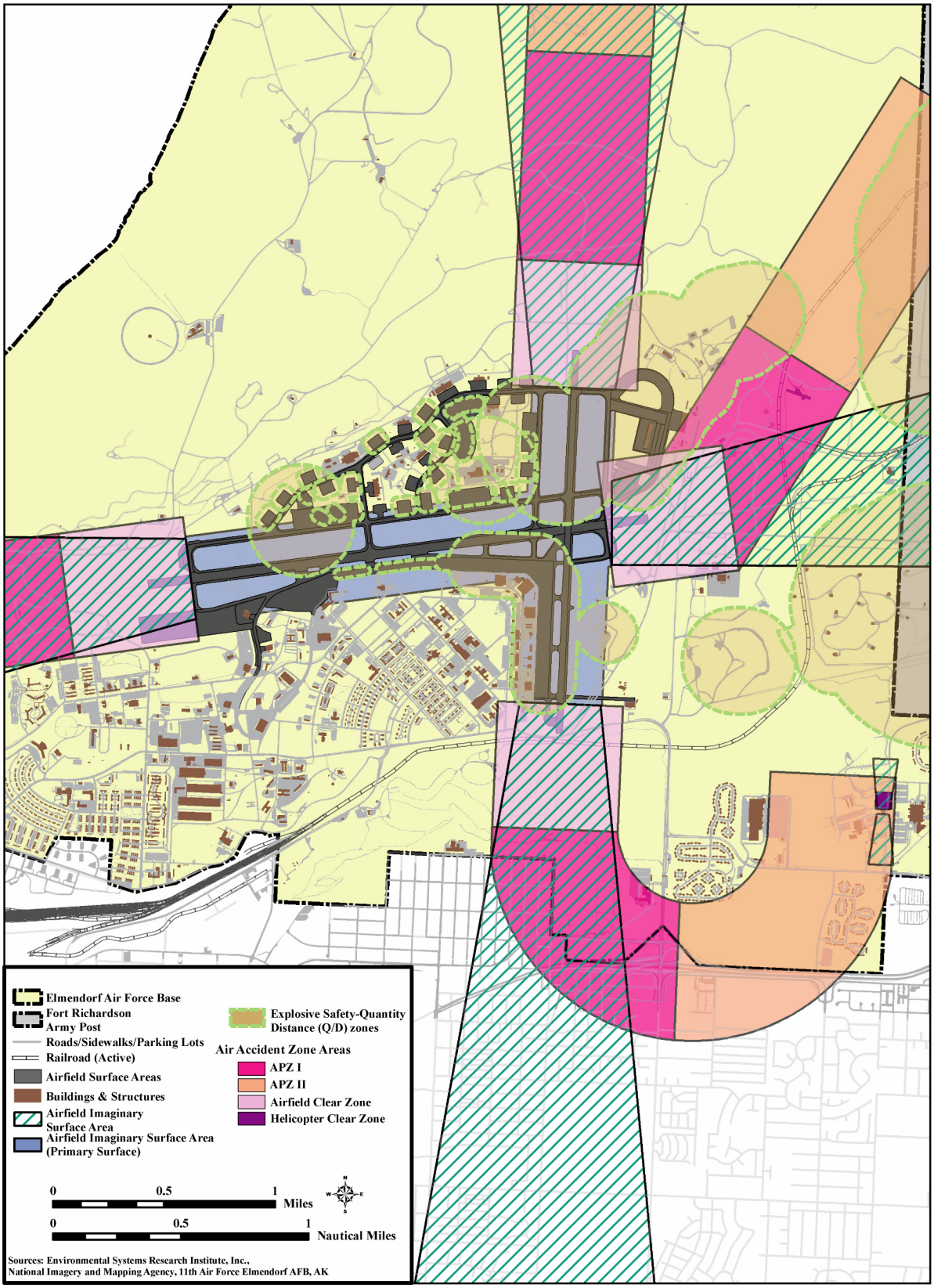
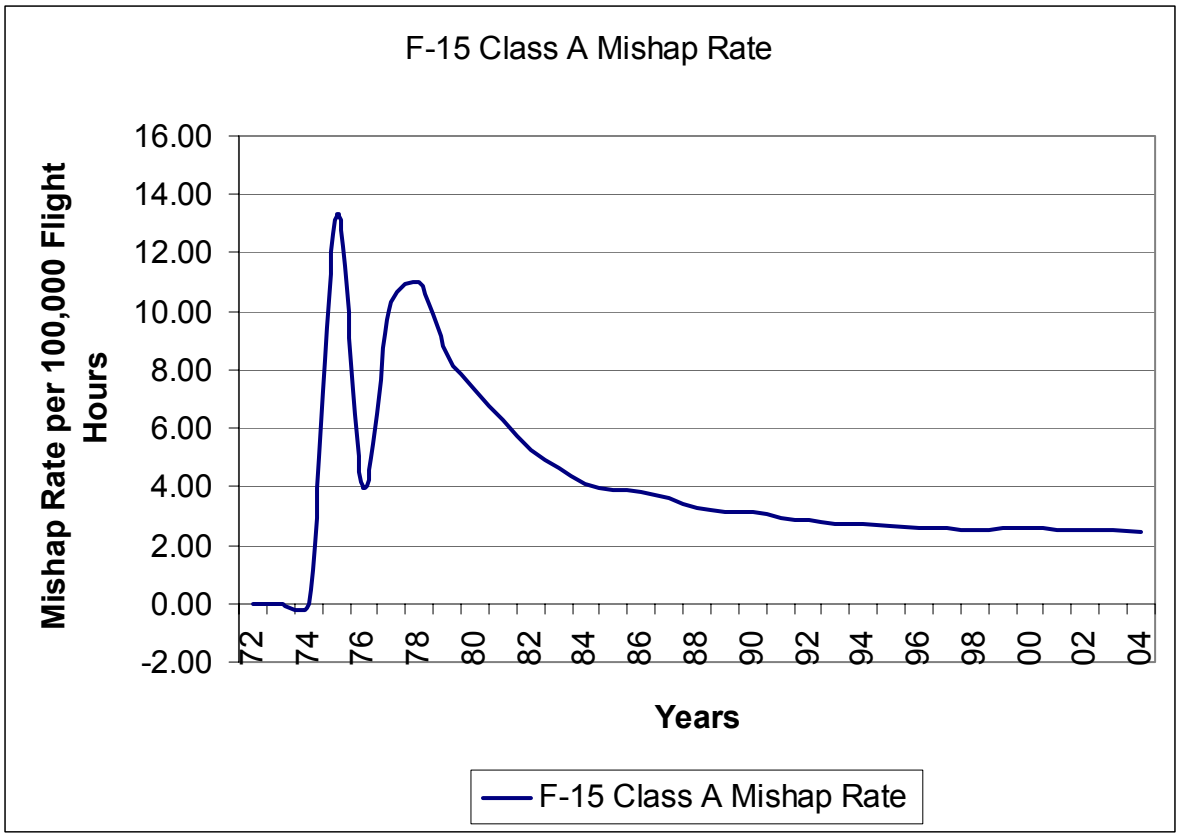


Figure 3.3-1. Elmendorf AFB Clear Zones and Accident Potential Zones



Source: Air Force Safety Center 2006.

FIGURE 3.3-2. F-15 CUMULATIVE CLASS A MISHAP RATES

3.3.2.3 AIRCRAFT MISHAPS

F-15 aircraft conduct the majority of sorties from Elmendorf AFB. In fiscal year (FY) 2000, which was one of the peak periods for operations, F-15 aircraft conducted approximately 10,000 sorties. If, on average, each aircraft spends approximately 10 minutes in the vicinity of the airfield, this means that F-15s accumulated approximately 1,667 flying hours around Elmendorf AFB. Considering all F-15s, since 1972 these aircraft have flown more than 4,998,100 hours. During that period, there have been 123 Class A mishaps, for a lifetime Class A mishap rate of 2.46 per 100,000 flying hours. Based on these data, a Class A mishap involving an Elmendorf-based F-15 in the vicinity of Elmendorf AFB would be projected to occur once every 24.4 years. To put this into perspective, the probability of a Class A mishap in the airfield environment for any given F-15 sortie is 0.000025.

Considering all operations at Elmendorf AFB, in more than 25 years there have been three Class A mishaps in the vicinity of the installation. Two were flight-related; one was non-flight-related. In 1995, an E-3 aircraft encountered a large flight of birds during takeoff. Birds were ingested into all engines resulting in a complete loss of power, and the aircraft crashed. In 2000, an aero club Cessna 152 departed controlled flight during a closed pattern, and crashed. In 1998, during engine shut down, a foreign object was ingested into the left engine of an F-15C while on the parking ramp. The aircraft did not crash although the dollar value of damages

resulting from this incident required classification as a Class A mishap (personal communication, Jennings 2005).

3.3.2.4 Wildlife Strike Hazard

Bird-aircraft strikes constitute a safety concern because they can result in damage to aircraft or injury to aircrews or local human populations if an aircraft crashes. Aircraft may encounter birds at altitudes up to 30,000 feet above mean sea level (MSL) or higher. However, most birds fly close to the ground. More than 97 percent of reported bird strikes occur below 3,000 feet above ground level (AGL). Approximately 30 percent of bird strikes happen in the airport environment, and almost 55 percent occur during low-altitude flight training (AFSC 2002).

Migratory waterfowl (e.g., ducks, geese, and swans) are the most hazardous birds to low-flying aircraft because of their size and their propensity for migrating in large flocks at a variety of elevations and times of day. Waterfowl vary considerably in size, from 1 to 2 pounds for ducks, 5 to 8 pounds for geese, and up to 20 pounds for most swans. There are two normal migratory seasons, fall and spring. Waterfowl are usually only a hazard during migratory seasons. These birds typically migrate at night and generally fly between 1,000 to 2,500 feet AGL during migration.

In addition to waterfowl, raptors, shorebirds, gulls, songbirds, and other birds also pose a hazard. In considering severity, the results of bird-aircraft strikes in restricted areas show that strikes involving raptors result in the majority of Class A and Class B mishaps related to bird-aircraft strikes. Raptors of greatest concern in the ROI are eagles and hawks. In Alaska, peak migration periods for waterfowl and raptors are from August to October and from April to May. A few bald eagles winter in the vicinity of Elmendorf AFB. In general, flights above 1,500 feet AGL would be above most migrating and wintering raptors.

Songbirds are small birds, usually less than one pound. During nocturnal migration periods, they navigate along major rivers, typically between 500 to 3,000 feet AGL. The potential for bird-aircraft strikes is greatest in areas used as migration corridors (flyways) or where birds congregate for foraging or resting (e.g., open water bodies, rivers, and wetlands).

While any bird-aircraft strike has the potential to be serious, many result in little or no damage to the aircraft, and only a minute portion result in a Class A mishap. During the years 1985 to 2004, the Air Force Bird-Aircraft Strike Hazard (BASH) Team documented 59,156 bird strikes worldwide. Of these, 25 resulted in Class A mishaps where the aircraft was destroyed. These occurrences constituted approximately 0.04 percent of all reported bird-aircraft strikes (AFSC 2004).

The 3 WG has developed aggressive procedures designed to minimize the occurrence of bird-aircraft strikes. The unit has documented detailed procedures to monitor and react to heightened risk of bird-strikes (Elmendorf AFB 2003), and when risk increases, limits are placed on low altitude flight and some types of training (e.g., multiple approaches, closed pattern work, etc.) in the airport environment. Special briefings are provided to pilots whenever the potential exists for greater bird-strike sightings within the airspace. Training and signs in open areas emphasize individual responsibilities and actions. Bird hazards exist on Elmendorf AFB year-round. Risk increases during spring and fall migration periods. Species of particular concern include Canada geese, swans, other waterfowl, sandhill cranes, gulls, raptors, and owls (Elmendorf AFB 2003). In the last 3 years, 3 WG aircraft have experienced approximately five bird-strikes per year in the airfield environment (personal communication, Jennings 2005).

Other wildlife of concern to flying operations at Elmendorf AFB include moose, wolves, coyotes, fox, bears, and smaller mammals (Elmendorf AFB 2003). Aggressive habitat management, fencing, active and passive dispersal techniques, and effective warning techniques serve to reduce the wildlife strike hazard at Elmendorf AFB (Elmendorf AFB 2003). For example, security fencing around the airfield excludes most large mammals.

3.3.2.5 Explosives Safety

All activities associated with the receipt, processing, transportation, storage maintenance, and loading of munitions items is accomplished by qualified technicians in accordance with DoD and Air Force technical procedures. The 3 WG has sufficient storage facilities and space for the storage and processing of mission-required ordnance items (personal communication, Norby 2005). There are two explosive safety waivers in effect at Elmendorf AFB. These involve two storage facilities whose safety arc encroaches on an on base transportation route (personal communication, Norby 2005).

There are three "hot cargo" pads on the installation, which are sufficient for handling explosive cargo. The primary pad is located near the eastern end of Runway 06/24. Additionally, there are two secondary pads. One is located toward the western end of Runway 06/24; the other is located off the extreme eastern end of Runway 06/24. All of the pads are situated north of the runway.

If required, support for explosive ordnance disposal (EOD) is provided by an active duty Air Force unit stationed at Elmendorf AFB. EOD requirements at Elmendorf AFB are also supported by an EOD range on the installation (personal communication, Norby 2005).

Section 2.2.2 and 2.2.3 describes existing F-15C and F-15E munitions and chaff and flare use as well as proposed use with a combination of F-15C and F-22A aircraft. Adequate capacity exists at Elmendorf to safely handle munitions currently used and the level of proposed use.

3.3.3 Environmental Consequences

3.3.3.1 Option A

An F-22A beddown would essentially replace existing F-15C and F-15E aircraft that have been in the Air Force inventory for decades with a new aircraft. Elmendorf AFB aircraft ground safety conditions would not change as a result of the F-22A beddown.

Historically, when new military aircraft first enter the inventory, the flight safety accident rate is higher. Safety data are limited for the F-22A because it is a new aircraft with multiple complex systems. These systems are undergoing refinement as the F-22A transitions from a test and training platform to an operational system. Class A mishaps are calculated on a basis of 100,000 flight hours. The F-22A has not yet achieved the level of flight hours. During test activities and weapons system development, the F-22A has had two Class A mishaps; this is not unusual for a new aircraft.

As the F-22A becomes operationally mature, the aircraft mishaps rate is expected to become comparable to that of the F-15, a similarly sized aircraft with a similar mission (see Section 3.3.2.3). Historical trends show that mishaps of all types decrease the longer an aircraft is operational as operations and maintenance personnel learn more about the aircraft's capabilities and limitations. Some of this experience has already been gained for the F-22A. Experience gained with F-22A test programs training and the Initial Operational Wing will provide

substantial knowledge about the F-22A safest flight regime. Such safety factors as computer self checks and simplified maintenance will permit the F-22A to operate as safely as, if not more safely than, the F-15C and F-15E.

Since the F-22A would operate in the same airfield environment as the F-15C and F-15E, the overall potential for bird-aircraft or wildlife strikes would decrease minimally because of the decrease in the number of F-22A and F-15C aircraft assigned compared to the number of F-15C and F-15E realigned. The potential for bird-aircraft strikes would be mitigated to some degree because the F-22A would more rapidly attain altitudes above where the majority of the strikes occur. Aircraft safety and bird-aircraft strikes under Option A are not expected to measurably differ from baseline conditions.

ELMENDORF AFB HAS AN ACTIVE BASH PROGRAM TO REDUCE THE POTENTIAL FOR BIRD AND WILDLIFE STRIKES AND ENHANCE AIRFIELD SAFETY.

The amount of munitions associated with the two F-22A squadrons is projected to be lower than that associated with the existing F-15E squadron. The number of chaff bundles would remain unchanged with the F-22A and F-15C mix and the number of flares deployed would remain the same. Elmendorf AFB has the personnel and facilities to handle the level of munitions and chaff and flares associated with implementing Option A.

A safety question raised during scoping asked whether the F-22A would dump fuel in an emergency. The F-22A stealth requirements do not include such items as a fuel dump valve that could provide a radar signature. The F-22A does not have the ability to dump fuel.

Other Elmendorf activities, including the construction of new buildings and facilities under Option A would not take place in CZs or APZs. The construction would be consistent with the Base General Plan and construction safety procedures would be part of any construction contract. The change in personnel is not expected to have an effect on safety.

3.3.3.2 Option B

Option B includes a variation on the construction, renovation, and infrastructure improvement projects. This option is also consistent with the Base General Plan. Option B aircraft operations, BASH risks, munitions handling, and personnel changes are as described in Option A.

3.3.3.3 Option C

Option C flight activities, BASH risks, munitions handling, and personnel changes are essentially the same as those described for Option A. Option C does present a variation on facility construction that uses and/or modifies facilities vacated by the Base Realignment and Closure (BRAC) relocation of F-15C and F-15E aircraft. New F-22A facilities would be constructed in the FTE area although aircraft storage locations would be split into three areas. As a result, some F-22A aircraft would be located in a CZ where current aircraft are located. While Option C maintains the current safety conditions, it is less safe than Options A or B due to aircraft parked in the lateral CZ.

3.3.3.4 No Action

Under the No Action Alternative, F-22A aircraft would not be assigned to Elmendorf AFB and no F-22A related facility construction or personnel changes would occur. Consequently, there would be no change to safety and the location of parked F-15C aircraft within a CZ would continue.

3.4 Air Quality

This section discusses air quality considerations and conditions in the area around Elmendorf AFB near Anchorage, Alaska. It addresses air quality standards, describes current air quality conditions in the region, and presents the environmental consequences to Elmendorf AFB.

3.4.1 Definition of Elmendorf AFB Air Quality

Federal Air Quality Standards. Air quality is determined by the type and concentration of pollutants in the atmosphere, the size and topography of the air basin, and local and regional meteorological influences. The significance of a pollutant concentration in a region or geographical area is determined by comparing it to federal and/or state ambient air quality standards. Under the authority of the Clean Air Act (CAA), the USEPA has established nationwide air quality standards to protect public health and welfare, with an adequate margin of safety.

These federal standards, known as the National Ambient Air Quality Standards (NAAQS), represent the maximum allowable atmospheric concentrations and were developed for six "criteria" pollutants: ozone (O_3), nitrogen dioxide (NO_2), carbon monoxide (CO), respirable particulate matter less than or equal to 10 micrometers in diameter (PM_{10}), sulfur dioxide (SO_2), and lead (Pb). The NAAQS are defined in terms of concentration (e.g., parts per million [ppm] or micrograms per cubic meter [$\mu g/m^3$]) determined over various periods of time (averaging periods). Short-term standards (1-hour, 8-hour, or 24-hour periods) were established for pollutants with acute health effects and may not be exceeded more than once a year. Long-term standards (annual periods) were established for pollutants with chronic health effects and may never be exceeded.

Based on measured ambient criteria pollutant data, the USEPA designates areas of the U.S. as having air quality equal to or better than the NAAQS (attainment) or worse than the NAAQS (nonattainment). Upon achieving attainment, areas are considered to be in maintenance status for a period of 10 or more years. Areas are designated as unclassifiable for a pollutant when there is insufficient ambient air quality data for the USEPA to form a basis of attainment status. For the purpose of applying air quality regulations, unclassifiable areas are treated similar to areas that are in attainment of the NAAQS.

The USEPA recently promulgated attainment designations for the newly established 8-hour O_3 standard effective as of June 15, 2004. Meanwhile, states must continue to implement existing plans developed under the 1-hour standard during the transition to the new 8-hour standard. On December 17, 2004, the USEPA designated areas as attainment or nonattainment for the newly developed standard for particulates less than 2.5 micrometers in diameter ($PM_{2.5}$), which are fine particulates that have not been previously regulated (USEPA 2005a).

State Air Quality Standards. Under the CAA, state and local agencies may establish ambient air quality standards and regulations of their own, provided that these are at least as stringent as the federal requirements. The State of Alaska has air quality standards that are identical to

the federal standards. A summary of the NAAQS that apply to the proposed project area is presented in Table 3-4-1.

Table 3-4-1. National and Alaska Ambient Air Quality Standards

Air Pollutant	*Averaging Time*	NAAQS	
		Primary	*Secondary*
Carbon Monoxide (CO)	8-hour 1-hour	9 ppm (10 μg/m^3) 35 ppm (40 μg/m^3)	--- ---
Nitrogen Dioxide (NO_2)	AAM	0.053 ppm (100 μg/m^3)	0.053 ppm (100 μg/m^3)
Sulfur Dioxide (SO_2)	AAM 24-hour 3-hour	0.03 ppm (80 μg/m^3) 0.14 ppm (365 μg/m^3) ---	--- --- 0.5 ppm (1,300 μg/m^3)
Particulate Matter (PM_{10})	AAM 24-hr	50 μg/m^3 150 μg/m^3	50 μg/m^3 150 μg/m^3
Particulate Matter ($PM_{2.5}$)[1]	AAM 24-hour	15 μg/m^3 65 μg/m^3	15 μg/m^3 65 μg/m^3
Ozone (O_3)[2]	8-hour	0.08 ppm	0.08 ppm
Lead (Pb) & Lead Compounds	3-month	1.5 μg/m^3	1.5 μg/m^3

Notes: 1. The $PM_{2.5}$ standard (particulate matter with a 2.5 μm diameter or smaller) was promulgated in December 2004 and is in effect as of 5 April 2005. The standard will be implemented over the next few years.
2. The 8-hour O_3 standard replaced the 1-hour standard in June 2005.
AAM = Annual Arithmetic Mean; ppm = parts per million; μg/m^3 = micrograms per cubic meter.

Sources: 40 Code of Federal Regulations (CFR) 50.

State Implementation Plan. For non-attainment regions, the states are required to develop a State Implementation Plan (SIP) designed to eliminate or reduce the severity and number of NAAQS violations, with an underlying goal to bring state air quality conditions into (and maintain) compliance with the NAAQS by specific deadlines. The SIP is the primary means for the implementation, maintenance, and enforcement of the measures needed to attain and maintain the NAAQS in each state.

Visibility. CAA Section 169A established the additional goal of prevention of further visibility impairment in Prevention of Significant Deterioration (PSD) Class I areas. Visibility impairment is defined as a reduction in the visual range and atmospheric discoloration. Determination of the significance of an activity on visibility in a PSD Class I area is typically associated with evaluation of stationary source contributions. The USEPA is implementing a Regional Haze rule for PSD Class I areas that will address contributions from mobile sources and pollution transported from other states or regions.

Emission levels are used to qualitatively assess potential impairment to visibility in PSD Class I areas. Decreased visibility may potentially result from elevated concentrations of PM_{10} and SO_2 in the lower atmosphere.

General Conformity. CAA Section 176(c), General Conformity, established certain statutory requirements for federal agencies with proposed federal activities to demonstrate conformity of the proposed activities with each state's SIP for attainment of the NAAQS. Federal activities must not:

(a) cause or contribute to any new violation;

(b) increase the frequency or severity of any existing violation; or

(c) delay timely attainment of any standard, interim emission reductions, or milestones in conformity to a SIP's purpose of eliminating or reducing the severity and number of NAAQS violations or achieving attainment of NAAQS.

General conformity applies only to nonattainment and maintenance areas. If the emissions from a federal action proposed in a nonattainment area exceed annual thresholds identified in the rule, a conformity determination is required of that action. The thresholds become more restrictive as the severity of the nonattainment status of the region increases.

Stationary Source Operating Permits. In Alaska, the Alaska Department of Environmental Conservation has primary jurisdiction over air quality and stationary source emissions at Elmendorf AFB. Title V of the CAA Amendments of 1990 requires states to issue Federal Operating Permits for major stationary sources. A major stationary source in an attainment or maintenance area is a facility (i.e., plant, base, or activity) that emits more than 100 tons per year (TPY) of any one criteria air pollutant, 10 TPY of a hazardous air pollutant, or 25 TPY of any combination of hazardous air pollutants. Thresholds are lower for pollutants for which a region is in nonattainment status. The purpose of the permitting rule is to establish regulatory control over large, industrial activities and to monitor their impact upon air quality.

3.4.2 Existing Conditions

Regional Air Quality. Federal regulations at 40 Code of Federal Regulations (CFR) 81 delineate certain air quality control regions (AQCRs), which were originally designated based on population and topographic criteria closely approximating each air basin. The potential influence of emissions on regional air quality would typically be confined to the air basin in which the emissions occur. Elmendorf AFB is located on the outskirts of Anchorage within the Cook Inlet Intrastate AQCR (AQCR 8), which encompasses 44,000 square miles including the municipality of Anchorage, the Kenai Peninsula Borough, and the Matanuska-Susitna Borough (40 CFR 81).

Attainment Status. A review of federally published attainment status for Alaska indicated that Anchorage is in attainment of NAAQS for all criteria pollutants except for the community of Eagle River, which is designated as nonattainment for PM_{10}, and located approximately 10 miles northeast of Elmendorf AFB. Also, a portion of Anchorage recently achieved attainment for CO in 2002, and is currently operating under a maintenance plan to assure continued attainment with the standard. The plan relies on control strategies needed to assure attainment of the NAAQS for CO. The strategy focuses on the Federal Motor Vehicle Emission Control Program, I/M program, ethanol-blended gasoline program, wintertime transit service, and promotion of engine preheaters. Elmendorf AFB is located adjacent to the northern boundary of this CO maintenance area.

PSD Class I Areas. No mandatory federal PSD Class I areas are located within the ROI. The nearest PSD Class I area is Denali National Park, which is 100 miles north-northwest of Elmendorf AFB.

Climate. Elmendorf AFB is located in the maritime zone of south-central Alaska, with moderate temperatures in both winter and summer. Mean annual precipitation is approximately 16 inches, with snowfall averaging around 80 inches per year. Summertime highs average in the low to mid-60s and wintertime lows average in the low to mid-single digits Fahrenheit. Prevailing winds in Anchorage are generally light and from the north to northeast during September through April and from the south to southwest from May to August. Seasonal mixing heights for Anchorage, which is the upper limit of the atmosphere in which ground-based emissions are expected to affect air quality, average around 2,000 feet and may reach 1,000 feet during winter months.

Current Emissions. Air emissions at Elmendorf AFB result from stationary and mobile sources. Stationary sources include boilers, emergency generators, and aircraft maintenance operations. Mobile sources include ground-based vehicles and aircraft. Elmendorf AFB is considered to be a major source of air emissions. For permitting purposes, Elmendorf AFB has been divided into nine different facilities based on their industrial classifications, rather than on their collective ownership and control by the Air Force. Only two of eight facilities, the Elmendorf Hospital and the Elmendorf Flightline, have potential criteria pollutant emissions large enough to require federal Title V operating permits. Elmendorf AFB also holds Owner Requested Limits, not included in the Title V permits, for Fire Protection Pumps and Road Painting. A recent summary of potential emissions is presented in Table 3.4-2.

Table 3.4-2. Baseline Potential Stationary Source Emissions at Elmendorf AFB

Description	Annual Emissions (tons per year)				
	NO_x	*CO*	*PM_{10}*	*SO_x*	*VOC*
Flight Line	164	99	27	158	29
Communications	54	15	6	29	14
Real Estate	111	92	12	1	6
Automotive Repair and Services	5	4	3	< 1	6
Health Services	58	33	4	26	3
Admin/Engineering	84	54	14	9	5
Fire Prevention	38	13	3	4	3
National Security	3	2	< 1	< 1	< 1

NO_x = nitrogen oxides; CO = carbon monoxide; PM_{10} = particulate matter less than or equal to 10 micrometers in diameter; SO_x = sulfur oxides; VOC = volatile organic compound
Source: Air Force 2005b.

Mobile source emissions have not been apportioned based on industrial classifications. A total of 41,340 aircraft operations occurred at Elmendorf AFB during 2005. These operations involved a total of 83 aircraft based at Elmendorf, plus a range of transient users. A survey was conducted in 2002 to estimate mobile source emissions, which are presented in Table 3.4-3.

Table 3.4-3. Baseline Mobile Source Emissions at Elmendorf AFB

Description	Annual Emissions (tons per year)				
	NO_x	CO	PM_{10}	SO_x	VOC
Aircraft based at Elmendorf AFB	529	353	95	144	59
Transient Aircraft	72	150	43	17	8
On-Wing Engine Testing	17	1	< 1	< 1	< 1
Aerospace Ground Support Equipment	175	25	8	5	1
Non-Road/Non-Vehicle Equipment	< 1	8	3	< 1	< 1
Government-Owned Vehicles	13	73	7	12	1
Privately-Owned Vehicles	33	367	24	215	3
TOTAL	**840**	**967**	**180**	**393**	**73**

NO_x = nitrogen oxides; CO = carbon monoxide; PM_{10} = particulate matter less than or equal to 10 micrometers in diameter; SO_x = sulfur oxides; VOC = volatile organic compound
Source: Air Force 2005b.

Regional Air Emissions. The previous section lists on-base emissions for Elmendorf AFB. The NEPA process, however, must also consider impacts from indirect emissions from stationary and mobile sources related to the project, some of which (for example, commuting of new employees to and from the facility) occur outside of the installation. For comparison purposes, Table 3.4-4 lists emissions for Greater Anchorage Area, and for Cook Inlet AQCR (AQCR 8, which includes the borough).

Table 3.4-4. Regional Emissions for Elmendorf AFB Affected Environment

	Pollutants (In Tons per Year)				
	NO_x	CO	PM_{10}	SO_2	VOC
Greater Anchorage Area	10,740	123,883	19,856	920	5,764
Total Cook Inlet AQCR	28,203	332,021	67,013	1,780	56,708

NO_x = nitrogen oxides; CO = carbon monoxide; PM_{10} = particulate matter less than or equal to 10 micrometers in diameter; SO_2 = sulfur dioxide; VOC = volatile organic compound
Source: USEPA 2005b.

3.4.3 Environmental Consequences

Air emissions resulting from the proposed F-22A beddown were evaluated in accordance with federal, state, and local air pollution standards and regulations. Air quality impacts from a proposed activity or action would be significant if they:

- increase ambient air pollution concentrations above any NAAQS;
- contribute to an existing violation of any NAAQS;
- interfere with or delay timely attainment of NAAQS; or
- impair visibility within any federally mandated federal Class I area.

The approach to the air quality analysis was to estimate any increase in emission levels due to the proposed beddown.

According to USEPA's General Conformity Rule in 40 CFR Part 51, Subpart W, any proposed federal action that has the potential to cause violations in a NAAQS nonattainment or maintenance area must undergo a conformity analysis. Since Elmendorf AFB is in attainment for all criteria pollutants, the anticipated emission resulting from the Proposed Action have been analyzed and it has been determined that the emissions will not cause or contribute to a new NAAQS violation. Furthermore, a conformity determination is not required as the emissions for all pollutants is below the de minimis threshold established by the USEPA in 40 CFR 93.153.

PSD regulations protect the air quality in regions that already meet the NAAQS. The nearest PSD Class I area is approximately 100 miles from the region potentially affected by the Proposed Action. Therefore, the Proposed Action would be unlikely to have a significant impact on any PSD Class I areas.

3.4.3.1 Option A

Option A would involve the drawdown of F-15C and F-15E aircraft, beddown of F-22A aircraft, and associated construction, demolition, grading, and paving projects.

Construction Emissions. Emissions during the construction period were quantified to determine the potential impacts on regional air quality. Calculations of volatile organic compounds (VOCs), nitrogen oxides (NO_x), CO, and PM_{10} emissions from construction, grading, and paving activities were performed using USEPA emission factors compiled in the *California Environmental Quality Air Quality Handbook* (South Coast Air Quality Management District 1993), *Calculations Methods for Criteria Air Pollution Emission Inventories* (Jagielski and O'Brien 1994), and *Air Emissions Inventory Guidance Document for Mobile Sources at Air Force Installations* (O'Brien and Wade 2002). The emission factors for building construction include contributions from engine exhaust emissions (i.e., construction equipment, material handling, and workers' travel) and fugitive dust emissions (e.g., from grading activities). Demolition emissions evaluated include fugitive dust and transport of demolition debris offsite. Site preparation, grading, and trenching emissions include fugitive dust from ground disturbance, plus combustive emissions from heavy equipment during the entire construction period. Paving emissions include combustive emissions from bulldozers, rollers, and paving equipment, plus emissions from a dump truck hauling pavement materials to the site. Estimated emissions that would occur from construction, demolition, grading, paving, and painting activities under Option A are presented in Table 3.4-5. The emissions shown would occur over the duration of the construction period.

Table 3.4-5. Construction Emissions – Option A

Source	Emissions (In Tons)					
	CO	*VOC*	*NO_x*	*SO_x*	*PM_{10}*	*$PM_{2.5}$*
Construction & Demolition	32.9	10.3	151.1	0.0	10.7	10.7
Grading/Trenching	5.8	1.0	8.2	0.8	1.9	1.9
New Pavement	14.5	3.0	32.2	2.6	2.3	2.3
Total	**53.2**	**14.3**	**191.5**	**3.4**	**14.9**	**14.9**

CO = carbon monoxide; VOC = volatile organic compound; NO_x = nitrogen oxides; SO_x = sulfur oxides; PM_{10} = particulate matter less than or equal to 10 micrometers in diameter; $PM_{2.5}$ = particulate matter less than or equal to 2.5 micrometers in diameter

Emissions generated by construction, demolition, and paving projects are temporary in nature and would end when construction is complete. The emissions from fugitive dust (PM_{10}) would be considerably less than those presented in Table 3.4-5 due to the implementation of control measures in accordance with standard construction practices. For instance, frequent spraying of water on exposed soil during construction, proper soil stockpiling methods, and prompt replacement of ground cover or pavement are standard landscaping procedures that could be used to minimize the amount of dust generated during construction. Using efficient practices and avoiding long periods where engines are running at idle may reduce combustion emissions from construction equipment. Vehicular combustion emissions from construction worker commuting may be reduced by carpooling.

In general, combustive and fugitive dust emissions would produce localized, short-term elevated air pollutant concentrations, which would not result in any long-term impacts on the air quality in the Anchorage region and AQCR 8. The temporary construction-related emissions of PM_{10} and sulfur oxides (SO_x) are not expected to adversely impact the air quality or visibility.

Operational Emissions. Air emissions after Option A is completed are expected to be slightly less than current operations, due to utilities such as boilers, heaters, emergency generators, and maintenance activities being included with the new facilities. The new utility equipment would be more efficient and have lower air pollutant emissions than older boilers and heaters at the base. Similarly, new fuel transfer and vehicle maintenance facilities would be constructed with modern equipment designed to minimize air emissions.

Air emissions from stationary and ground-based sources related to aircraft maintenance, including aerospace ground equipment, engine test cells, chemical usage, degreasing, and painting are expected to decrease relative to baseline emissions due to the lower maintenance requirements of the F-22A as compared to the F-15C or F-15E.

The installation or modification of any air emission sources, such as boiler and heaters, emergency generators, corrosion control, etc., would need to be evaluated on an individual basis with regards to the Title V permits and stationary source regulations applicable to the base.

Aircraft Emissions. In addition to the facilities that would be added under Option A, the emissions from aircraft operations at the base, including landings and take-offs, touch-and-goes, and low approaches, would change due to the replacement of the F-15C and F-15E aircraft with

the new F-22A aircraft. As the aircraft operations for the F-22A would be roughly equivalent to those currently employed by the F-15C and F-15E aircraft, the differences in emissions could be predicted from the differences in engine characteristics between the incoming and outgoing aircraft. Such qualitative comparison could also be applied to sorties being flown in Alaskan airspace. Aircraft emission factors are available in O'Brien and Wade (2002) and Wade (2002) for the F-15C, F-15E, and F-22A aircraft. The F-22A consumes more fuel per hour of flying time than either the F-15C or F-15E, thus increasing emissions of most pollutants. The higher efficiency of the engine in the F-22A, however, results in lower emissions of VOCs for this aircraft. For the other criteria pollutants, emissions from an F-22A would be higher than those from an F-15 aircraft. The effects of any emissions increase per aircraft would be offset by the reduced number of aircraft and the higher flight altitudes employed by the F-22A aircraft, as shown in Table 2.2-3, which would lead to greater dispersion of the pollutants at the higher altitudes. It is expected that these changes in emissions due to Option A would not result in any impacts on the air quality of the Anchorage area or AQCR 8.

Indirect Emissions. After construction, Option A would result in a decrease of employees commuting to and from the base, which would result in a corresponding decrease in air pollutant emissions from personally owned commuting vehicles.

3.4.3.2 Option B

Option B would involve the same change in assigned aircraft as in Option A, and similar associated construction, demolition, grading, and paving projects, as detailed in Table 2.1-5.

Construction Emissions. Emissions during the construction period were quantified as for Option A. Estimated emissions that would occur from construction, demolition, grading, paving, and painting activities under Option B are presented in Table 3.4-6. The emissions shown would occur over the duration of the construction period.

Table 3.4-6. Construction Emissions – Option B

Source	Emissions (In Tons)					
	CO	*VOC*	*NO_x*	*SO_x*	*PM_{10}*	*$PM_{2.5}$*
Construction & Demolition	26.4	8.3	121.6	0.0	8.6	8.6
Grading/Trenching	5.8	1.0	8.2	0.8	1.6	1.6
New Pavement	12.3	2.6	26.8	2.1	1.9	1.9
Total	**44.5**	**11.9**	**156.6**	**2.9**	**12.1**	**12.1**

CO = carbon monoxide; VOC = volatile organic compound; NO_x = nitrogen oxides; SO_x = sulfur oxides; PM_{10} = particulate matter less than or equal to 10 micrometers in diameter; $PM_{2.5}$ = particulate matter less than or equal to 2.5 micrometers in diameter

In general, combustive and fugitive dust emissions would produce localized, short-term elevated air pollutant concentrations, which would not result in any long-term impacts on the air quality in the Anchorage region and AQCR 8. The temporary construction-related emissions of PM_{10} and SO_x are not expected to adversely impact the air quality or visibility in any PSD Class I area.

Operational Emissions. As for Option A, the air emissions after Option B is completed are expected to be slightly less than current operations, due to utilities such as boilers, heaters, emergency generators, and maintenance activities being included with the new facilities. New

utility equipment would be more efficient and have lower air pollutant emissions than older boilers and heaters at the base. Similarly, new fuel transfer and vehicle maintenance facilities would be constructed with modern equipment designed to minimize air emissions from stationary and ground-based sources.

Aircraft Emissions. Base aircraft operations would be the same under Option B as under Option A. Changes in aircraft emissions due to Option B would not result in any impacts on the air quality of the Anchorage area or AQCR 8.

Indirect Emissions. Implementation of Option B would also result in the long run decrease of employees commuting to and from the base, which would result in a corresponding decrease in air pollutant emissions from personally owned vehicles.

3.4.3.3 Option C

Option C would involve the same change in assigned aircraft as in Option A, and similar associated construction, demolition, grading, and paving projects, as detailed in Table 2.1-5.

Construction Emissions. Emissions during the construction period were quantified as for Option A. Estimated emissions that would occur from construction, demolition, grading, paving, and painting activities under Option C are presented in Table 3.4-7. The emissions shown would occur over the duration of the construction period.

Table 3.4-7. Construction Emissions – Option C

Source	Emissions (In Tons)					
	CO	*VOC*	*NO_x*	*SO_x*	*PM_{10}*	*$PM_{2.5}$*
Construction & Demolition	32.9	10.3	151.1	0.0	10.7	10.7
Grading/Trenching	5.8	1.0	8.2	0.8	1.7	1.7
New Pavement	12.3	2.6	26.8	2.1	1.9	1.9
Total	**51.0**	**13.9**	**186.1**	**2.9**	**14.3**	**14.3**

CO = carbon monoxide; VOC = volatile organic compound; NO_x = nitrogen oxides; SO_x = sulfur oxides; PM_{10} = particulate matter less than or equal to 10 micrometers in diameter; $PM_{2.5}$ = particulate matter less than or equal to 2.5 micrometers in diameter

In general, combustive and fugitive dust emissions would produce localized, short-term elevated air pollutant concentrations, which would not result in any long-term impacts on the air quality in the Anchorage region and AQCR 8. The temporary construction-related emissions of PM_{10} and SO_x are not expected to adversely impact the air quality or visibility in any PSD Class I area.

Operational Emissions. As for Option A, the air emissions after Option C is completed are expected to be slightly less than current operations, due to utilities such as boilers, heaters, emergency generators, and maintenance activities. New utility equipment and fuel transfer would be more efficient and have lower air pollutant emissions than older boilers and heaters at the base. Air emissions from stationary and ground-based sources related to aircraft maintenance are expected to decrease relative to baseline emissions due to the lower maintenance requirements of the F-22A fleet.

Aircraft Emissions. Aircraft operations at the base would be the same under Option C as under Option A. It is expected that the changes in aircraft emissions due to Option C would not result in any long-term impacts on the air quality of the Anchorage area or AQCR 8.

Indirect Emissions. As with Option A, implementation of Option C would result in a decrease of employees commuting to and from the base, which would result in a corresponding decrease in air pollutant emissions from personally owned vehicles commuting to and from the base.

3.4.3.4 No Action

Under the No Action Alternative, no construction emissions would occur and operational emissions would be identical to current baseline.

3.5 Physical Resources

3.5.1 Definition of Elmendorf AFB Physical Resources

Physical resources consist of earth and water resources and hazardous materials and waste management. Hazardous materials are identified and regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); the Occupational Safety and Health Administration; and the Emergency Planning and Community Right-to-Know Act. Hazardous materials have been defined in AFI 32-7086, *Hazardous Materials Management*, to include any substance with special characteristics that could harm people, plants, or animals. Hazardous waste is defined in the Resource Conservation and Recovery Act as any solid, liquid, contained gaseous or semisolid waste, or any combination of wastes that could or do pose a substantial hazard to human health or the environment. Waste may be classified as hazardous because of its toxicity, reactivity, ignitibility, or corrosivity. In addition, certain types of waste are "listed" or identified as hazardous in 40 CFR 263. The ROI for this resource is defined as Elmendorf AFB.

3.5.2 Existing Conditions

3.5.2.1 Earth Resources

Earth resources include the geology, soils, and topography of Elmendorf AFB. The principal geologic factors influencing stability of structures are soil stability and seismic properties. Soil, in general, refers to unconsolidated earthen materials overlying bedrock or other parent material. Soil structure, elasticity, strength, shrink-swell potential, and erodibility all determine the ability for the ground to support structures and facilities. Relative to development, soils typically are described in terms of their type, slope, physical characteristics, and relative compatibility or limitations with regard to particular construction activities and types of land use. Long-term geological, erosional, and depositional processes typically influence the topographic relief of an area.

The bedrock beneath Elmendorf AFB consists of Tertiary clastic sedimentary rocks, which to the east form a wedge overlying Mesozoic metamorphic rocks of the Chugach Mountains. Glacial and related deposits, including terminal moraines, ground moraines, and glacial outwash plains, dominate regional landforms on Elmendorf AFB and in the Anchorage area. The most distinctive landform at Elmendorf AFB is the Elmendorf Moraine, a southwest-northeast trending terminal moraine. The moraine consists of horizontally and vertically discontinuous, unconsolidated glacial till with poorly sorted boulders, gravel, sand and silt deposits. Finer-grained clay lens deposits are found throughout the moraine and may result in zones of

perched groundwater. The southern boundary of the moraine is visible as a rising bluff line along the north side of Elmendorf's east-west runway. Moraine elevations range from 200 to 300 feet MSL.

South of the Elmendorf Moraine lies the glacial outwash plain alluvium. The alluvium deposits were formed by a series of coalescing streams resulting from glacial melt water. These outwash plain deposits consist of unconsolidated fine- to medium-grained, poorly sorted sand and gravel. Elevations range from 100 to 225 feet MSL. Relief is mostly flat, and slopes gently to the south-southwest. Most of the developed areas on the base have been built in the outwash plain alluvium. Over 90 percent of the contaminated sites are located in this area.

Underlying glacial moraine and outwash deposits are the shallow marine deposits of the Bootlegger Cove formation. The Bootlegger Cove formation is a fine-grained glacioestuarine deposit consisting of silt and clay. Depth to the Bootlegger Cove formation ranges from 1 to 60 feet below ground surface near the moraine and from 75 to 100 feet below ground surface throughout the outwash plain. Overall, the formation is thought to be at least 125 feet thick and may be more than 250 feet thick in certain locations.

Soils at Elmendorf AFB and the surrounding area are dominated by three types of unconsolidated deposits: coarse-grained, fine-grained, and till. Based on grain size and moisture content, these soil types likely have low to moderate potential for erosion by water or wind. The runway area at Elmendorf AFB is underlain by surficial zones of sand and gravel deposited as either glacial outwash or alluvium along stream channels. The sand and gravel is typically well drained, high in strength, low in compressibility, nonfrost susceptible, and an excellent foundation material.

Elmendorf AFB is located in an area that is seismically active and has also been affected by volcanic eruptions of Mount Spurr, Mount St. Augustine, and Mount Redoubt. The Mount St. Augustine volcanic eruption in January 2006 threatened the Anchorage area with ash deposition. Two earthquake faults border the Anchorage area. The Border Ranges Fault bisects the area east of Elmendorf AFB and a second fault runs in the Chugach Mountains. Elmendorf AFB lies in a tectonic basin bounded by the Bruin Bay-Castle Mountain fault system to the west and the Denali fault system to the north. This is an active tectonic setting, with seismic events along both fault systems as well as the underlying Benioff Zone. This zone results from subduction forces pushing the Pacific tectonic plate beneath the North American plate. Intermediate to shallow seismic incidents related to the fault systems, as well as deeper events associated with the subduction, are common. The 1964 earthquake triggered numerous landslides in the Anchorage area, including nearby areas along the Knik Arm. The sliding was attributed both to failures in sensitive clays and the liquefaction of the sandy layers in the upper portions of Bootlegger Cove Formation and to the unusually long duration of the earthquake.

3.5.2.2 Water Resources

Water resources include surface and groundwater features located within the base as well as watershed areas affected by existing and potential runoff from the base, including floodplains.

Elmendorf AFB is divided into seven resource management units based on environmental, physical, and/or social features such as watersheds, topography, land use patterns, ownership, and roads. The only unit under coastal zone management is Unit 7, Coastal Mudflats. Within this unit, there may be areas of special concern that require special management activities. The Coastal Mudflats (Unit 7) contains approximately 150 acres of shoreline that are within the

coastal zone boundary managed by Elmendorf AFB (Air Force 2004a). In addition to the Coastal Zone Management Act of 1972 (16 USC 1451 *et seq.*) as amended through the Coastal Zone Act Reauthorization Amendments of 1990 and Public Law (P.L.) 104-150, the Coastal Zone Protection Act of 1996, this unit falls under other specific regulations, including the Marine Protection, Research, and Sanctuaries Act (33 USC 1401 *et seq.*), the Marine Mammal Protection Act of 1972 (16 USC 1361 *et seq.*) as amended through 1997, and the Rivers and Harbors Act of 1899 (33 USC 403). Federal lands are excluded from coastal zone boundaries. However, all uses and activities that directly affect the coastal area must be consistent to the maximum extent practical with the Alaska Coastal Management Program and they are subject to the consistency provisions of Section 307 of the Coastal Zone Management Act of 1972, as amended (16 USC 1451 *et seq.*). The "Integrated Natural Resources Management" implementation (AFI 32-7064, Air Force 1994) directs that bases with coastal or marine properties must enter into an agreement with the Coastal American National Implementation Team to assist in the restoration and protection of coastal areas.

The Air Force has a Memorandum of Understanding with Coastal America (Coastal America 1992) to perform the following:

- Protect, preserve, and restore the nation's coastal ecosystems through existing federal capabilities and authorities.
- Collaborate and cooperate in the stewardship of coastal living resources by working together and in partnership with other federal programs.
- Provide a framework for action that effectively focuses expertise and resources on jointly identified problems to produce demonstrable environmental and programmatic results that may serve as models for effective management of coastal living resources.

The Proposed Action option locations are not within the 150 acres of shoreline that are within the coastal zone boundary managed by Elmendorf AFB.

Surface Water. The four major hydrologic systems at Elmendorf AFB, in order of decreasing size, are Ship Creek, Six-Mile Creek, EOD Creek, and the Cherry Hill Ditch. There are also a total of 12 natural and man-made lakes and ponds on the base that range in size from 1 acre to nearly 124 acres in surface area. Elmendorf AFB has 8 miles of saltwater shoreline bordering the Knik Arm of the Cook Inlet.

Ship Creek is the largest surface water drainage system on Elmendorf AFB. The Ship Creek headwaters are located within the Chugach State Park at an elevation of 5,100 feet. The stream flows west through the southern edge of Elmendorf AFB for approximately 4.2 miles and empties into the Knik Arm. The upper Ship Creek basin is an important recharge area for the deeper confined aquifer and provides approximately one quarter of total recharge to the system.

Six-Mile Creek and EOD Creek are located north of the Elmendorf Moraine. Six-Mile Creek originates as springs located near the Elmendorf AFB and Fort Richardson boundary. Cherry Hill Ditch is the major storm water drainage system for the main base area south of the Elmendorf Moraine.

The base maintains compliance with its National Pollutant Discharge Elimination System (NPDES) Multi-Sector General Permit for protection of surface water by non-point source pollutants. Surface water is also protected by measures outlined in Elmendorf AFB's Storm

Water Pollution Prevention Plan (SWPPP), which has identified potential pollutant sources and relevant BMPs to reduce the potential for pollution of receiving waters (Air Force 2005c). In addition to the Elmendorf AFB SWPPP, any new construction projects on Elmendorf AFB that would affect more than 1 acre are required to develop a project-specific SWPPP, implement BMPs, and notify the USEPA about the project.

Groundwater. Two principal groundwater aquifers have been identified in the glacial outwash plain alluvium and on the Elmendorf Moraine. These aquifers include a shallow unconfined aquifer (shallow aquifer), and a deeper confined aquifer. The Bootlegger Cove formation acts as the confining layer between the shallow and deep aquifers. In general, groundwater flow direction in the shallow aquifer matches closely that of the surface topography. Subsurface flow is to the northwest along the north limb of the moraine, and to the southeast along the south limb. The groundwater divide coincides with the crest of the moraine. The shallow aquifer on Elmendorf is not used for drinking water. This aquifer generally exists between 10 to 50 feet below ground surface.

The deeper confined aquifer is found under the entire base and generally flows in a westerly direction from the Chugach Mountains toward Knik Arm of the Cook Inlet. Groundwater from the deeper confined aquifer at Elmendorf AFB serves only as a standby drinking water supply when surface water supplies cannot meet the demand. However, the municipal area bordering Elmendorf AFB uses groundwater for various services including industrial, commercial, domestic, and public supply. Based upon groundwater monitoring data, there is contamination in portions of the shallow aquifer on-site. However, the deeper confined aquifer has not been impacted by any contaminants from sources on Elmendorf AFB. The Bootlegger Cove formation seems an effective barrier between the aquifers; there is no evidence they are interconnected.

The main source of drinking water for Elmendorf AFB is supplied by Fort Richardson. The Fort Richardson water treatment plant draws surface water from Ship Creek and filters and treats the water before it is delivered to the base through four water mains.

3.5.2.3 Hazardous Materials and Waste Management

Hazardous Materials. The majority of hazardous materials used by Air Force and contractor personnel at Elmendorf AFB are controlled through an Air Force pollution prevention process called Hazardous Materials Pharmacy (HAZMART). This process provides centralized management of the procurement, handling, storage, and issuing of hazardous materials and turn-in, recovery, reuse, or recycling of hazardous materials. The HAZMART process includes review and approval by Air Force personnel to ensure users are aware of exposure and safety risks. Pollution prevention measures are likely to minimize chemical exposure to employees, reduce potential environmental impacts, and reduce costs for material purchasing and waste disposal.

Hazardous Waste Management. Elmendorf AFB is a large-quantity hazardous waste generator. Hazardous wastes generated during operations and maintenance activities include combustible solvents from parts washers, inorganic paint chips from lead abatement projects, fuel filters, metal-contaminated spent acids from aircraft corrosion control, painting wastes, battery acid, spent x-ray fixer, corrosive liquids from boiler operations, toxic sludge from washracks, aviation fuel from tank cleanouts, and pesticides.

Hazardous wastes are managed in accordance with the Elmendorf AFB OPlan 19-3. Hazardous wastes are initially stored at approximately 50 satellite accumulation areas. Satellite accumulation areas allow for the accumulation of up to 55 gallons of hazardous waste (or one quart of an acute hazardous waste) to be stored at or near the point of waste generation. There are two 90-day waste accumulation sites on Elmendorf AFB located at 4314 Kenney Avenue and 11735 Vandenberg Avenue. The base is identified by USEPA identification number AK8570028649. In FY 2005, 56,568 pounds of hazardous waste were removed from Elmendorf AFB and disposed of in off base permitted disposal facilities.

The Elmendorf AFB Spill Prevention Control and Countermeasures Plan addresses on-base storage locations and proper handling procedures of all hazardous materials to minimize potential spills and releases. The plan further outlines activities to be undertaken to minimize the adverse effects of a spill, including notification, containment, decontamination, and cleanup of spilled materials.

The Elmendorf AFB Asbestos Management Plan provides guidance on the management of asbestos. An asbestos facility register is maintained by Civil Engineering. Persons inspecting, designing, or conducting asbestos response actions in public or commercial buildings must be properly trained and accredited through an applicable asbestos training program. The design of building alteration projects and requests for self-help projects are reviewed to determine if asbestos contaminated materials are present in the proposed work area and, if so, are disposed of in an off base permitted landfill.

Environmental Restoration Program (ERP). The DoD developed the ERP to identify, investigate, and remediate potentially hazardous material disposal sites on DoD property prior to 1984. In August 1990, Elmendorf AFB was placed on the National Priorities List bringing it under the federal facility provisions of CERCLA Section 120. Currently the Air Force has identified 85 sources of contamination from operations that occurred prior to 1984. These sources have been placed into three groups: CERCLA sources (40 sources), state program sources (40 sources) and Resource Conservation and Recovery Act sources (5 sources) (Air Force 2003a).

Sources that are in close proximity to facilities that may be renovated or where new construction is potentially considered by the beddown of the F-22A include CERCLA sources SS-22, SD-28 and SD-29 and three state program sources ST-34, ST-48, and ST-67. The proposed location of the Fire Crash Station could be affected by results of a remedial investigation/feasibility study of ERP site SS-22.

ERP site SS-22 is located east of the Defense Reutilization and Marketing Office (DRMO) storage facility. After being closed with a no further remedial action plan in 1991, the site was reopened as a result of discovery of buried debris encompassing 22 acres and tar seeps in two separate areas in 2002. A remedial investigation/feasibility study programmed for FY 07.

ERP site SD-28 is located in Building 16710 which was used as a wash rack for ground refueling equipment. Wash and rinse waters, containing a petroleum-based solvent used for parts degreasing, drained into a dry well for a period of time prior to the wash rack being connected to the sanitary sewer.

ERP site SD-29 is located near Building 16716 between Taxiway F and Talley Way. The primary source of contamination is thought to be from hazardous materials associated with aircraft maintenance activities disposed down floor drains that flowed into dry wells. The primary

contaminants of concern for groundwater include tetrachoroethylene and trichloroethylene. In 1994, soil investigations noted that soil contamination did not exceed regulatory limits.

Both ERP site SD-28 and 29 are components of Operable Unit 4 and the Record of Decision was signed in September 1995. The selected remedy includes land use controls which prohibit the use of the shallow aquifer until cleanup goals are achieved and groundwater monitoring to evaluate contaminant migration and timely reduction of contaminant concentrations by natural attenuation (Air Force 2004c).

ERP site ST-34 is a former Army-Air Force Exchange Services gas station that had a fuel release in 1991 from one of the feed lines. The underground storage tanks and associated piping and contaminated soils were removed. The site (ST-506/9) is currently managed under the state program.

ERP site ST-48 is located north of Building 10571, also known as Hangar 3. A pipeline leak in 1968 resulted in a release of approximately 700-800 gallons of diesel fuel. None of the fuel was recovered and site investigations identified elevated levels of total petroleum hydrocarbons and polycyclic aromatic hydrocarbons in the soil. An asphalt parking lot was installed over the contaminated area, limiting contact with the contaminated soils. This State Program site is currently being monitored under the Basewide Groundwater Program (Air Force 2004d).

ERP site ST-67 is located east of Heritage Circle at Building 9569. A regulated underground storage tank storing diesel fuel failed a tank tightness test and was taken out of service in 1992. The site was closed in October 1994 (Air Force 2004d)

Monitoring wells are located within or near ERP site SD-28, SD-29, and ST-34 and their locations will need to be considered as project siting for the beddown of the F-22A is evaluated.

3.5.3 Environmental Consequences

3.5.3.1 Option A

Earth Resources. Construction of the F-22A facilities to support Option A would disturb approximately 50 acres in an area that was previously disturbed with the initial construction of the base. Approximately 30 acres consist of 50 to 60 year old second growth timber. The area east of the north-south runway is generally flat with some improvements and road corridors. The ground surface would be cleared of existing vegetation, graded and prepared for the installation of subsurface utilities and building foundations. All facilities would be designed and constructed to meet seismic design standards for the base. Since more than 1 acre would be disturbed by construction, a construction NPDES storm water permit would be required. Under the permit, the base must develop a site-specific SWPPP that describes BMPs to be implemented to eliminate or reduce sediment and non-storm water discharges. With proper design and implementation of the SWPPP, impacts from erosion and off-site sedimentation would be negligible.

Water Resources. Construction of the facilities that would support the beddown of the F-22A under this option would generate storm water runoff from the construction for a four-year time span. Runoff from these construction areas could contain contaminants that would degrade the quality of receiving waters. Once the facilities are constructed storm water from the new impervious surfaces would be directed to open areas by sheet flow or swales for percolation in to the shallow aquifer.

The overall Elmendorf AFB SWPPP identifies erosion control practices to be followed for exposed soil surfaces. These standard erosion control practices include the use of mulch or

artificial cover where repeated disturbance is expected and stabilization of soil within 30 days of final disturbance through vegetative or permanent artificial means (e.g., paving or rip-rapping). With adherence to BMPs, adverse effects from erosion would be avoided.

The Air Force would ensure that construction activities are conducted in accordance with the applicable storm water discharge permit for any areas that result in soil disturbance. Site-specific management plans and BMPs would be implemented to control erosion and prevent sediment, debris or other pollutants from entering storm water during site activities.

Once facility construction is completed and operations commence, the base's SWPPP also specifies procedures for spill prevention and response, routine inspection of discharges at sites, and proper training of employees. With implementation of BMPs, impacts to surface water quality at Elmendorf AFB would not be considered significant.

Option A is not within the 150 acres of shoreline that are within the coastal zone boundary managed by Elmendorf AFB, no impacts to coastal areas would be expected as a result of the Proposed Action.

Hazardous Materials. Existing procedures for the centralized management of the procurement, handling, storage, and issuing of hazardous materials through the HAZMART are adequate to handle the changes anticipated with the beddown of the F-22A, but would be expanded to meet the increased use. Construction of the F-22A facilities may require the use of hazardous materials by contractor personnel. Project contractors would comply with federal, state, and local environmental laws and would employ affirmative procurement practices when economically and technically feasible.

All hazardous materials and construction debris generated by the proposed project would be handled, stored, and disposed of in accordance with federal state and local regulations and laws. Permits for handling and disposal of hazardous material would be coordinated by the contractor with the base hazardous waste program manager. The use of hazardous materials would not cause adverse impacts.

In the event of fuel spillage during demolition or construction, the contractor would be responsible for its containment, clean up, and related disposal costs. The contractor would have sufficient spill supplies readily available on the pumping vehicle and/or at the site to contain any spillage. In the event of a contractor related release, the contractor would immediately notify the 3 WG Civil Engineering/Environmental Flight and take appropriate actions to correct its cause and prevent future occurrences.

Hazardous Waste. Elmendorf AFB would continue to generate hazardous wastes during various operations and maintenance activities. Hazardous waste disposal procedures, including off base disposal procedures, are adequate to handle changes in quantity and would remain the same. The base's OPlan 19-3 would be updated to reflect any changes of hazardous waste generators and waste accumulation point monitors. The number of hazardous waste accumulation sites would be modified to handle the change in waste generation and there would be no adverse impacts. In the event that any hazardous wastes are generated as a result of F-22A maintenance activities that present any unique hazards over those generated by the F-15C and F-15Es, Elmendorf AFB would implement appropriate hazardous waste control procedures to minimize potential risks to personnel and the environment.

The stealth coatings of the F-22A require special treatment. Low observability composite repair facilities are proposed for construction as part of the F-22A facilities at Elmendorf. These

facilities provide engineering and environmental controls whereby any hazardous materials associated with the composite materials used by the F-22A can be isolated from the air and water environments for safe disposition.

Environmental Restoration Program. Construction of facilities under Option A would have only one contaminated site near the proposed construction associated with FTE. ERP Site ST-34, the former Army-Air Force Exchange Services gas station located along Vandenberg Drive, is on the edge of the proposed construction for FTE, but not within the construction footprint of any F-22A related construction activity. This site is managed now under the state program and this option would not be expected to result in interference with ongoing remediation activities on Elmendorf AFB. It is unlikely that any activities associated with construction activities would impact the site because the ERP site is not directly located within the construction zone. As noted in Section 3.5.2.3, the siting of the Fire Crash Station could be adjusted following evaluation of ERP site SS-22. There would be the potential to have contaminated soil under the currently proposed Fire Crash Station site.

The Air Force will coordinate with the restoration office before any construction work is initiated. The Air Force will ensure that construction activities are coordinated with ongoing remediation or investigation activities at any CERCLA site.

3.5.3.2 Option B

Earth and Water Resources. Construction of the F-22A facilities to support Option B would disturb approximately 40 acres in an area that was previously disturbed with the initial construction of the base, of which approximately 20 acres consist of second growth trees. Disturbed areas would be approximately 20 percent less than under Option A. The area to be disturbed would include approximately 36 acres east of the north-south runway that is generally flat with some improvements and road corridors. The ground surface would be cleared of existing vegetation, graded, and prepared for the installation of subsurface utilities and building foundations. An additional site would be developed near buildings 16670 and 15658 for flow-through aircraft weather shelters. All facilities would be designed and constructed to meet seismic design standards for the base. Option B is not within the 150 acres of shoreline that are within the coastal zone boundary managed by Elmendorf AFB, no impacts to coastal areas would be expected as a result of the Proposed Action.

Since more than 1 acre would be disturbed by construction, a construction NPDES storm water permit would be required. An SWPPP, comparable to the one noted under Option A, would describe BMPs to be implemented to eliminate or reduce sediment and non-storm water discharges. As with Option A, Option B would have negligible effects from erosion or off-site sedimentation. Site-specific management plans and BMPs would be implemented to control erosion and prevent sediment, debris, or other pollutants from entering storm water during site activities.

Hazardous Materials, Hazardous Waste, and the Environmental Restoration Program. Option B would not result in any different consequences to hazardous materials, hazardous wastes, or implementing the base ERP than those described for Option A. Option B includes construction of facilities to treat and maintain the composites and materials used to preserve stealth characteristics for the F-22A.

3.5.3.3 Option C

Earth and Water Resources. Construction of the F-22A facilities to support Option C would disturb approximately 30 acres in an area that was previously disturbed with the initial construction of the base. Approximately 10 acres consist of second growth trees. The area east of the north-south runway is generally flat with some improvements and road corridors. The ground surface would be cleared of existing vegetation, graded, and prepared for the installation of subsurface utilities and building foundations. Under this option, there would be increased use of existing facilities and the largest number of renovated facilities. All facilities would be designed and constructed to meet seismic design standards for the base. Option C is not within the 150 acres of shoreline that are within the coastal zone boundary managed by Elmendorf AFB, no impacts to coastal areas would be expected as a result of the Proposed Action. Since more than 1 acre would be disturbed by construction, a construction NPDES storm water permit would be required. The Option C SWPPP would describe BMPs to be implemented to eliminate or reduce sediment and non-storm water discharges. Consequences would be essentially the same as those discussed for Option A.

Hazardous Materials, Hazardous Waste, and the Environmental Restoration Program. Option C would not result in any different consequences to hazardous materials, hazardous wastes, or implementing the base ERP. Option C includes construction of facilities to treat and maintain the composites and materials used to preserve stealth characteristics for the F-22A. As with Options A and B, no significant impacts to physical resources would be expected to result from F-22A construction or operation at Elmendorf AFB.

3.5.3.4 No Action

No Action would mean no F-22A beddown at Elmendorf AFB. No additional construction supporting the F-22A program would occur and no ground disturbing activities would take place. Aircraft maintenance activities, generating hazardous waste, would continue to support the existing F-15C and F-15E squadrons and the other aircraft stationed at Elmendorf AFB.

3.6 Biological Resources

3.6.1 Definition of Elmendorf AFB Biological Resources

Biological resources in this discussion refers to plants and animals and the habitats in which they occur on and within the environs of Elmendorf AFB. Assemblages of plant and animal species within a defined area that are linked by ecological processes are referred to as natural communities. The existence and preservation of these resources are intrinsically valuable; they also provide aesthetic, recreational, and socioeconomic values to society. This section focuses on plant and animal species or vegetation types associated with Elmendorf AFB that typify or are important to the function of the ecosystem, are of special societal importance, or are protected under federal or state law or statute. For purposes of the analysis, Elmendorf and neighboring biological resources will be organized into three major categories: (1) vegetation and habitat, including wetlands; (2) fish and wildlife; and (3) special-status species.

Federal laws and regulations that apply to biological resources include: Fish and Wildlife Coordination Act, Migratory Bird Treaty Act, Clean Water Act, NEPA, Federal Land Policy and Management Act, Endangered Species Act (ESA), Sikes Act, Marine Mammal Protection Act, state hunting regulations, and state laws protecting plants and nongame wildlife.

In this section the ROI for biological resources is Elmendorf AFB and its immediate vicinity. Specifically, effects to biological resources will focus on the footprint for construction activities

proposed under each option and any potential for construction or operation of F-22A facilities to impact biological resources.

Vegetation includes all existing terrestrial plant communities, but excludes discussion of special-status plants, which are discussed under special-status species below. The composition of plant species within a given area defines ecological communities and determines the types of wildlife that may be present. Wetlands are a special category of sensitive habitats and are subject to regulatory authority under Section 404 of the Clean Water Act, Executive Order (EO) 11990 *Protection of Wetlands*, and EO 19988 *Floodplain Management*. The USACE administers the Clean Water Act, and has jurisdiction over all waters of the U.S., including wetlands. Jurisdictional wetlands are those areas that meet all the criteria defined in the USACE's *Wetlands Delineation Manual* (Environmental Laboratory 1987).

Fish and wildlife includes all vertebrate animals with the exception of special-status species, which are discussed separately. Typical animals include vertebrate groups such as fish, amphibians, songbirds, waterfowl, hoofed animals, carnivores, bats, rodents and other small mammals. The attributes and quality of available habitats determine the composition, diversity, and abundance patterns of wildlife species assemblages, or communities. Each species has its own set of habitat requirements and interspecific interactions driving its observed distribution and abundance. Community structure is derived from the net effect of the diverse resource and habitat requirements of each species within a geographic setting. For this reason, an assessment of habitat types and area affected by the Proposed Action can serve as an overriding determinant in the assessment of impacts for wildlife populations.

Special-status species are defined as those plant and animal species listed as threatened, endangered, candidate, or species of concern by the United States Fish and Wildlife Service (USFWS) or the National Marine Fisheries Service, as well as those species with special-status designations by the state of Alaska. The ESA protects federally listed threatened and endangered plant and animal species. Candidate species are species that USFWS is considering for listing as threatened or endangered but for which a proposed rule has not yet been developed. Candidates do not benefit from legal protection under the ESA. In some instances, candidate species may be emergency listed if USFWS determines that the species population is at risk due to a potential or imminent impact. The USFWS encourages federal agencies to consider candidate species in their planning process because they may be listed in the future and, more importantly, because current actions may prevent future listing. Species of concern are species for which data were inconclusive to support ESA protection at the time of the proposed listing. It is an informal designation, although USFWS recommends tracking of population trends and threats. The Alaska Department of Fish and Game also maintains a list of endangered species and species of special concern.

3.6.2 Existing Conditions

Vegetation. Elmendorf AFB is situated across rolling upland plains near the head of Cook Inlet (Knik Arm) in southcentral Alaska within the Coastal Trough Humid Taiga Province (Bailey 1995). The area is characterized by spruce-hardwood forests, bottomlands of spruce-poplar forests along major drainages, and dense stands of alder and willow along riparian corridors. Wet tundra communities bracket the coast. Approximately 4,202 acres of Elmendorf AFB's 13,455 acres are disturbed or cleared for base facilities (Air Force 2000).

There are 1,534 acres of wetlands at Elmendorf AFB (Air Force 2000). Wetland types are varied and range from palustrine scrub-shrub and forested wetlands to lacustrine and estuarine wetlands.

Fish and Wildlife. Elmendorf AFB supports a diverse array of wildlife species, including large and small mammals, raptors, waterfowl, songbirds, and fish. Due to the northerly latitude of the base, no reptiles occur, while the wood frog (*Rana sylvatica*) is the only amphibian species.

Moose (*Alces alces*), black bears (*Ursus americanus*), brown bears (*u. arctos*), and wolves (*Canis lupus*) are prevalent on the base and are typical residents of the Alaskan environment. These species have large home ranges which also includes the neighboring Fort Richardson and Chugach State Park. Between 20 and 70 moose are estimated by Alaska Fish and Game to live on Elmendorf AFB, depending on the time of year, as portions of the herd migrate off base in fall and winter. Twelve to 24 black bears occur in summer, while 6 to 12 of these will spend the winter in dens on the base. Three to 6 brown bears inhabit Elmendorf AFB in summer. Two wolf packs roam the lands of Elmendorf AFB and Fort Richardson (Air Force 2000). Coyotes (*Canis latrans*) are also common. Lynx (*Lynx canadensis*) and red fox (*Vulpes vulpes*) also occur.

Elmendorf AFB also supports populations of small mammals including beaver (*Castor canadensis*), muskrat (*Ondatra zibethicus*), porcupine (*Erethizon dorsatum*), red squirrel *(Tamiasciurus hudsonicus*),snowshoe hare (*Lepus americanus*), river otter (*Lutra canadensis*), short-tailed weasel (*Mustela erminea*), and mink (*M. vison*).

At least 112 bird species are known to occur or have the potential to occur at Elmendorf AFB (Air Force 2000). Waterfowl and shorebirds use the base's ponds, bogs, wetlands, and coastal marshes in summer and on spring and fall migration. Raptors include osprey (*Pandion haliaetus*), red-tailed hawk (*Buteo jamaicensis*), rough-legged hawk (*B. lagopus*), sharp-shinned hawk (*Accipiter striatus*), northern goshawk (*A. gentils*), merlin (*Falco columbarius*), northern harrier (*Circus cyaneus*), northern saw-whet owl (*Aegolius acadius*), boreal owl (*A. funereus*), and great horned owl (*Bubo virginianus*). Bald eagles (*Haliaeetus leucocephalus*), currently listed as federally threatened in the lower 48 states, also reside on the base. Common breeding birds include alder flycatcher (*Empidonax alnorum),* boreal chickadee (*Poecile hudsonica*), black-capped chickadee (*P. atricapillus*), gray jay (*Perisoreus Canadensis*), Swainson's thrush (*Catharus ustulatus*), myrtle warbler (*Dendroica coronata*), American robin (*Turdus migraterius*), slate-colored junco (*Junco hyemalis*), ruby-crowned kinglet (*Regulus calendula*), and white-winged crossbill (*Loxia leucoptera*).

Ten fish species occur at Elmendorf AFB, including the five Pacific salmon species (Air Force 2000). Ship Creek and Six-Mile Creek are the main spawning creeks for these anadromous fish on the base.

SHIP CREEK IS AN IMPORTANT URBAN SALMON FISHERY.

Special-Status Species. There are no federally listed threatened or endangered species that inhabit Elmendorf AFB (Table 3.6-1). Six Alaska species of special concern may occur on or near the base. These are olive-sided flycatcher (*Contopus borealis*), blackpoll warbler (*Dendroica striata*), peregrine falcon (*Falco peregrinus*), gray-cheeked thrush (*Catharus minimus*), Townsend's warbler (*Dendroica townsendi*), and beluga whale (*Delphinapterus leucas*). The olive-sided flycatcher and blackpoll warbler are known nesting species on the base (Air Force 2000). Both species are found in coniferous forests, with the flycatcher preferring more open forests (Ehrlich *et al.* 1988).

Table 3.6-1. The Relationship of Special-Status Species to Elmendorf AFB and Environs

Common Name	*Scientific Name*	*Status*	*Occurrence at Elmendorf AFB*
Aleutian shield fern	*Polystichum aleuticum*	FE	No
Chinook salmon (Fall stock from Snake River)	*Oncorhynchus tshawytscha*	AK SSC	No
Leatherback sea turtle	*Dermochelys coriacea*	FE	No
Short-tailed albatross	*Phoebastria albatrus*	FE, AKE	No
Kittlitz's murrelet	*Brachyramphus brevirostris*	FC	No
Eskimo curlew	*Numenius borealis*	FE, AKE	No
Spectacled eider	*Somateria fisheri*	FT, AK SSC	No
Stellar's eider (AK breeding population)	*Polysticta stelleri*	FT, AK SSC	No
Aleutian Canada goose	*Branta canadensis leucopareia*	AK SSC	No
Peregrine falcon	*Falco peregrinus*	AK SSC	Potential Migrant
Northern goshawk (southeast AK population)	*Accipiter gentilis laingi*	AK SSC	No
Olive-sided flycatcher	*Contopus cooperi*	AK SSC	Yes
Gray-cheeked thrush	*Catharus minimus*	AK SSC	Migrant
Townsend's warbler	*Dendroica townsendi*	AK SSC	Potential
Blackpoll warbler	*Dendroica striata*	AK SSC	Yes
Brown bear (Kenai Peninsula population)	*Ursus arctos horribilis*	AK SSC	No
Sea otter (southwest Alaska distinct population segment)	*Enhydra lutris kenyoni*	FT, AK SSC	No
Harbor seal	*Phoca vitulina*	AK SSC	No
Stellar sea-lion	*Eumetopias jubatus*	FT=eastern population, FE=western population AK SSC	No
Bowhead whale	*Balaena mysticetus*	FE, AK SSC	No
Finback whale	*Balaenoptera physalus*	FE	No
Humpback whale	*Megaptera novaeangliae*	FE, AKE	No
Right whale	*Eubalaena glacialis*	AKE	No
Blue whale	*Balaenoptera musculus*	AKE	No
Beluga whale (Cook Inlet population)	*Delphinapterus leucas*	AK SSC	No, but occur in adjacent waters that may be affected by base noise contours

FE = Federal Endangered; FT = Federal Threatened; FC = Federal Candidate; AKE = State of Alaska Endangered; AK SSC = State of Alaska Species of Special Concern.
Sources: Alaska Department of Fish and Game 2005a and 2005b, USFWS 2005.

Peregrine falcon and gray-cheeked thrush migrate through the area and may be occasionally observed (Air Force 2000). Peregrine falcons nest on cliffs, generally over water, but these features do not occur at Elmendorf AFB. Peregrines may, however, use riparian and wetland areas on the base to hunt for prey, such as waterfowl. The gray-cheeked thrush breeds in moist coniferous forests and woodlands, arctic tundra, and riparian thickets. It is a habitat generalist on migration (Ehrlich *et al.* 1988), and therefore could occur in various habitats at Elmendorf AFB. Townsend's warbler, another coniferous forest inhabitant, may also occur on base. The Cook Inlet population of beluga whale occurs in waters adjacent to Elmendorf AFB.

3.6.3 Environmental Consequences

Four areas of consideration are used to identify the potential environmental consequences to wildlife and habitat. These areas are (1) the importance (i.e., legal, commercial, recreational, ecological, or scientific) of the resource; (2) the proportion of the resource that would be affected relative to its occurrence in the region; (3) the sensitivity of the resource to proposed activities; and (4) the duration of any ecological ramifications. Impacts to resources would be considered significant if special-status species or habitats are adversely affected over relatively large areas or disturbances cause significant reductions in population size or distribution of a special-status species (40 CFR 1508.2).

Specific concerns for biological resources within the base environs ROI are habitat loss due to construction of new facilities, noise associated with construction, and noise associated with the operation and maintenance of the F-22As at Elmendorf AFB. Concerns for species near Elmendorf AFB include noise and potential run-off to water resources from construction or operation.

3.6.3.1 Option A

Under Option A, 50 acres would be affected by construction, renovation, and infrastructure improvements in one area on the base. Approximately 60 percent of this acreage includes a stand of 50 to 60 year old second growth trees. This forest stand is composed of paper birch (*Betula papyrifera*), white spruce (*Picea glauca*), aspen (*Populus tremuloides*), and scouler willow (*Salix scouleriana*). The understory is sparse but includes highbush cranberry (*Viburnum trilobum*), sitka alder (*Alnus viridis*), prickly rose (*Rosa acicularis*), and various forbs. No wetlands would be disturbed or lost. Affected landscaped areas would be replaced following construction. Construction contracts would specify fugitive soil and dust control to prevent run-off into water resources.

Wildlife species affected by loss of forest in Option A are red squirrel and several bird species, including ruby-crowned kinglet, American robin, Swainson's thrush, slate-colored junco, myrtle warbler, orange-crowned warbler (*Vermivora celata*), and common redpoll. These species may be displaced or disturbed by construction, but would be expected to move elsewhere on the base.

Any new or new types of hazardous materials associated with F-22A stealth coatings under Option A would be prevented from reaching water resources by new facilities for maintenance of aircraft composites and coatings.

Five special-status bird species may occur at Elmendorf AFB. The peregrine falcon, gray-cheeked thrush, and Townsend's warbler would be unlikely to inhabit the developed and affected portions of Elmendorf AFB. Small numbers of olive-sided flycatcher and blackpoll

warbler may occur in the forest stand in the southeast part of the base. Clearing this marginal habitat during breeding season could disrupt some nesting birds.

Noise contours associated with the proposed operation of the F-22As at Elmendorf AFB are projected to be similar to current conditions (see Section 3.2.3). On-base species have apparently become tolerant of regular aircraft and other noise.

The noise contours extend into the Knik Arm of Cook Inlet, where beluga whales occur. Moore *et al.* (2000) reported that beluga responses to aircraft included no response and diving. Based on the literature review of noise effects on marine mammals presented in Appendix D, noise associated with Option A would not be expected to adversely affect beluga whales.

3.6.3.2 Option B

Under Option B, 40 acres in two general areas would be affected by construction, renovation, and infrastructure improvements. Some of this acreage is on lands already developed or that have otherwise been disturbed for base facilities. However, similar to Option A, some of this construction could result in the clearing of approximately 20 acres of 50 to 60 year old second growth forest in the southeast portion of the base. No wetlands would be affected.

As with Option A, some migratory bird species, including the olive-sided flycatcher and blackpoll warbler may occur in the forest stand in the southeast part of the base. As noted with Option A, the habitat is marginal for these and other migratory species.

Option B construction fugitive dust, soils erosion, and hazardous materials would be controlled to protect water resources as they would be under Option A. The somewhat different commute pattern under Option B, when compared with Option A, is not expected to affect the biological environment.

Option B noise contours would be the same as those for Option A and consequences would be the same.

3.6.3.3 Option C

Under Option C, approximately 30 acres would be affected by construction, renovation, and infrastructure improvements in three general areas of the base. Most of this acreage is on lands already developed or otherwise disturbed for base facilities. Similar to Option A, some of this construction would result in the clearing of approximately 10 acres of 50 to 60 year old second growth forest in the southeast portion of the base. No wetlands would be affected. As with Option A, some migratory bird species, including the olive-sided flycatcher and blackpoll warbler may occur in the forest stand in the southeast part of the base. As noted with Option A, the habitat is marginal for these and other migratory species. As with Option A, construction contracts would mandate fugitive dust and soils control that would protect wetlands and waterways.

Option C noise contours would be the same as those for Option A and consequences would be the same.

3.6.3.4 No Action

Under the No Action Alternative, two squadrons of F-22A would not be beddown at Elmendorf AFB. Construction of new support facilities would not occur. Mission requirements would dictate continued availability of F-15C and F-15E types of aircraft. Biological resources would not be expected to change from baseline conditions.

3.7 Cultural Resources

3.7.1 Definition of Elmendorf AFB Cultural Resources

Cultural resources are any prehistoric or historic district, site, or building, structure, or object considered important to a culture or community for scientific, traditional, religious or other purposes. They include archaeological resources, historic architectural resources, and traditional resources. The Elmendorf AFB historical setting is summarized in Appendix F. Archaeological resources are locations where prehistoric or historic activity measurably altered the earth or produced deposits of physical remains (e.g., arrowheads, bottles). Historic architectural resources include standing buildings and other structures of historic or aesthetic significance. Architectural resources generally must be more than 50 years old to be considered for inclusion in the NRHP, although resources dating to defined periods of historical significance, such as the Cold War era (1946-1990) may also be considered eligible. Traditional resources are associated with cultural practices and beliefs of a living community that are rooted in its history and are important in maintaining the continuing cultural identity of the community. Historic properties (as defined in 36 CFR 60.4) are significant archaeological, architectural, or traditional resources that are either eligible for listing, or listed in, the National Register of Historic Places (NRHP). Both historic properties and significant traditional resources identified by Alaska Natives are evaluated for potential adverse impacts from an action.

The ROI for cultural resources is the area within which an option to implement the Proposed Action could potentially affect existing cultural resources. For the Proposed Action, the ROI for cultural resources is defined as Elmendorf AFB and its environs. Cultural resources under the training airspace are discussed in Section 4.7.

3.7.2 Existing Conditions

Archaeological Resources

Since the beginning of cultural resource investigations on Elmendorf AFB in 1978, most survey work has been concentrated along the northwest border of the base property. Through these survey efforts 27 archaeological sites have been located, none of which are located within the project areas. While these sites have not been definitively evaluated for NRHP eligibility, 18 are recommended as ineligible, five are unevaluated, and four are considered potentially eligible (Air Force 2003b). Three of the four potentially eligible sites are cabin ruins associated with homesteading and the fourth, also a cabin ruin, has Alaska Native/traditional features and a possible secondary military association (Air Force 2003b). No NRHP-listed archaeological resources have been located in the project areas (Air Force 2003b; National Register Information Service [NRIS] 2006).

Architectural Resources

There are 48 NRHP eligible buildings or structures on Elmendorf AFB, most of which are located in one of three historic districts: the Flightline Historic District; the Alaska Air Depot Historic District; and the Generals' Quad Historic District (Figure 3.7-1). Of the historic structures outside the three historic districts, Hangar 16 (Building 15658) is located in the vicinity of EA options. Also on base are 602 unevaluated facilities constructed during the Cold War era, 365 of which are now or will turn 50 years of age by 2007 (Air Force 2003b). Elmendorf AFB has consulted with the Alaska State Historic Preservation Officer (SHPO) regarding Hangar 16 and the potential for impacts to its viewshed.

ELMENDORF'S HISTORIC STRUCTURES REFLECT OVER 60 YEARS OF BASE CONTRIBUTION TO NATIONAL DEFENSE.

Traditional Cultural Properties and Alaska Native Concerns

Although no traditional cultural properties have yet been identified on Elmendorf AFB, neighboring Alaska Natives have raised concerns regarding the possibility of Alaska Native burials located on Elmendorf AFB property (Air Force 2003b). Ongoing consultation between the Air Force and Alaska Natives on this and other issues is conducted on a government-to-government basis. The federally recognized tribes in the Elmendorf AFB area are the Eklutna and Knik Tribes (Air Force 2003b).

3.7.3 Environmental Consequences

A number of federal regulations and guidelines have been established for the management of cultural resources. Section 106 of the National Historic Preservation Act (NHPA), as amended, requires federal agencies to take into account the effects of their undertakings on historic properties. Historic properties are cultural resources that are listed in, or eligible for listing in, the NRHP. Eligibility evaluation is the process by which resources are assessed relative to NRHP significance criteria for scientific or historic research, for the general public, and for traditional cultural groups. Under federal law, impacts to cultural resources may be considered adverse if the resources have been determined eligible for listing in the NRHP or have been identified as important to Alaska Natives as outlined in the *American Indian Religious Freedom Act* and EO 13007, *Indian Sacred Sites*. DoD Alaska Native Policy (1999) provides guidance for working with federally-recognized Alaska Native governments. DoD policy requires that installations provide timely notice to, and consult with, tribal governments prior to taking any actions that may have the potential to significantly affect protected Alaska Native resources, rights, or lands.

Analysis of potential impacts to cultural resources considers direct impacts that may occur by physically altering, damaging, or destroying all or part of a resource; altering characteristics of the surrounding environment that contribute to the resource's significance; introducing visual or audible elements that are out of character with the property or alter its setting; or neglecting the resource to the extent that it deteriorates or is destroyed. Direct impacts can be assessed by identifying the types and locations of proposed activity and determining the exact location of cultural resources that could be affected. Indirect impacts generally result from increased use of an area.

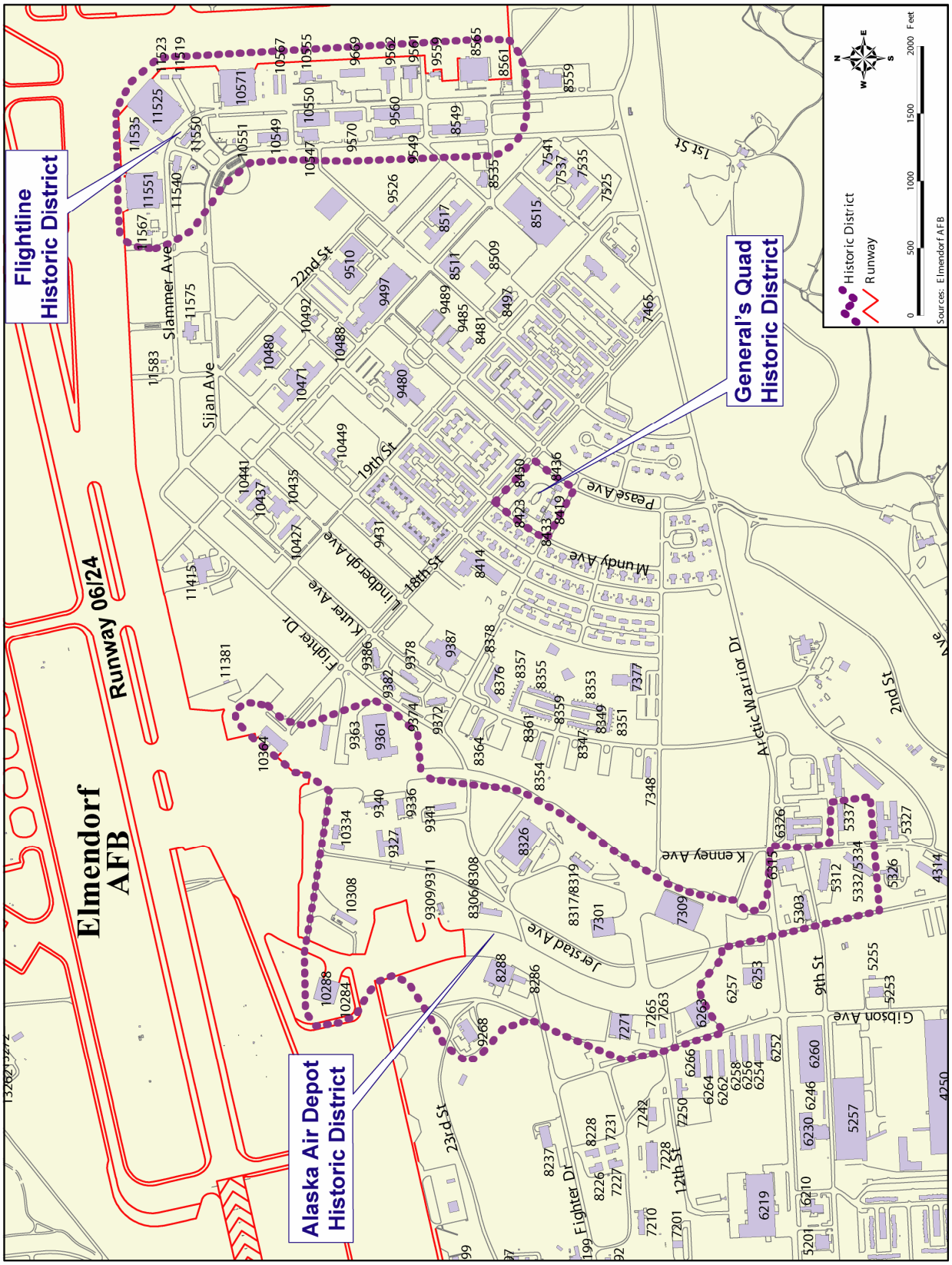


Figure 3.7-1. Elmendorf AFB Historic Districts

For all options, consultation with the Alaska SHPO regarding the potential effects to the viewshed of Hangar 16 (Building 15658) has occurred and the SHPO has concurred that there would be no adverse effect to the structure's setting under any of the options. However, compliance with Section 106 of the NHPA, including SHPO consultation regarding NRHP eligibility and potential effects to buildings that are eligible or that may be found to be eligible, would take place prior to demolition or renovation. All ground-disturbing activities have a possibility of encountering previously unrecorded and unknown archaeological resources. If suspected artifacts of any type (wood, stone, bone, metal, etc.) or other unidentifiable materials are inadvertently uncovered during ground disturbing activities, the soil disturbance activities in that area must cease until environmental staff can determine whether or not the materials warrant further actions under the Native American Graves Protection and Repatriation Act, Archeological Resources Protection Act, or the NHPA.

If bones are discovered in the course of excavation on the base, the work resulting in the discovery should stop, and the individual implementing the work (e.g., the non commissioned officer in charge or job foreman) will immediately notify the Cultural Resources Manager of the find. The Cultural Resources Manager will ensure that Integrated Cultural Resources Management Plan procedures are implemented (Air Force 2003b).

According to an agreement between Elmendorf AFB and the Alaska SHPO, only modifications to the exterior of an NRHP-listed or NRHP-eligible structure requires SHPO consultation. Modifications to the interior are not viewed as an impact to NRHP integrity, and do not necessitate SHPO consultation (personal communication, Lawton 2006).

3.7.3.1 Option A

Within the environs of Elmendorf AFB, Option A would develop new facilities to house the incoming F-22A squadrons in a development on the southeast portion of the base. The FTE development would cover approximately 50 acres in a single, consolidated location and include 19 construction, renovation, demolition, or infrastructure improvement projects to be implemented between 2006 and 2009. Option A also includes the construction of Flight Simulator and Field Training Detachment facilities away from FTE on the central portion of the base. This option would renovate two structures, Hangar 16 (Building 15658), built in 1954, and the Egress Shop (Building 10555), constructed in 1963. It would also demolish two existing structures constructed in 1963, the Sentry Gate House (Building 9637) and Ammunition Storage Igloo (Building 10641). Hangar 16 is eligible for the NRHP; the Egress Shop, the Sentry Gate House and the Ammunition Storage Igloo, although less than 50 years old, would need to be evaluated for possible inclusion on the NRHP on the merit of a Cold War era association, before demolition or exterior renovation. Option A has the potential to impact historic properties if consultation with the SHPO determines that exterior renovations to Hangar 16 will affect the eligibility of this NRHP-eligible structure, or if any of the other structures are eligible for the NRHP and exterior renovations would affect their NRHP eligibility. None of the structures that would be demolished or renovated under Option A is within any of the three historic districts found on base.

While there are no recorded archaeological resources in the areas of the proposed FTE development or Flight Simulator and Field Training Detachment facilities, and the areas have been previously disturbed during Elmendorf's history, the areas have not been surveyed for archaeological resources (Air Force 2003b). It is possible that ground disturbing activities could

encounter previously unknown and unevaluated cultural resources. If such resources were encountered, and if they were determined to be eligible for the NRHP, impacts to archaeological resources could occur under Option A.

3.7.3.2 Option B

For the Elmendorf AFB environ, Option B would develop new facilities to house the incoming F-22A squadrons on the southeast and east portions of the base. The FTE development would cover approximately 40 acres in two locations and include 17 construction, renovation, demolition, or infrastructure improvement projects to be implemented between 2006 and 2009. As with Option A, Option B includes the construction of Flight Simulator and Field Training Detachment facilities away from FTE on the central portion of the base. Six existing structures would be demolished or renovated. Hangars 15, 16, and 17 (Buildings 16716, 15658, and 16670) and the Egress Shop (Building 10555) would be renovated while the Ammunition Storage Igloo (Building 10641) and the Sentry Gate House (Building 9637) would be demolished. Building 16670 (Hangar 17) was constructed in 1995 and does not merit consideration for NRHP eligibility. Buildings 10641 and 9637 were constructed in 1962, Building 10555 in 1963, and Building 16716 in 1956. Building 15658 was constructed in 1954 and is considered eligible for the NRHP. All unevaluated structures proposed for demolition or exterior renovation and either older than 50 years or dating to the Cold War era would need to be evaluated for their NRHP eligibility prior to demolition or exterior renovation. Option B would have the potential to impact historic properties if consultation with the SHPO determines that exterior renovations to Hangar 16 will affect this NRHP-eligible structure, or if any of the other structures are eligible for the NRHP and exterior renovations would affect their eligibility. None of the structures that would be demolished or renovated under Option B is within any of the three historic districts found on base.

As with Option A, there are no recorded archaeological resources in the areas of the proposed FTE development or Flight Simulator and Field Training Detachment facilities. The areas have never been surveyed for archaeological resources (Air Force 2003b). It is possible that ground disturbing activities could encounter previously unknown and unevaluated cultural resources. If such resources were encountered, and if they were determined to be eligible for the NRHP, impacts to archaeological resources could occur under Option B.

3.7.3.3 Option C

Option C would develop new facilities to house the incoming F-22A squadrons on the southeast and east portions of the base where Option B construction would occur. In addition, Option C includes construction within the Flightline Historic District. Development would include 18 construction, renovation, demolition, or infrastructure improvement projects to be implemented between 2006 and 2009. Like Options A and B, Option C would also include the construction of Flight Simulator and Field Training Detachment facilities away from FTE on the central portion of the base. Like Option B, Option C would renovate Hangars 15, 16, and 17 (Buildings 16716, 15658, and 16670) and the Egress Shop (Building 10555) and would demolish the Ammunition Storage Igloo (Building 10641) and the Sentry Gate House (Building 9637). Under Option C, Hangars 2 and 3 (Buildings 11525 and 10571) would also be renovated. Constructed in 1995, Hangar 17 does not merit consideration for inclusion on the NRHP. Hangar 16, built in 1954, has been determined eligible for the NRHP. Hangars 2 and 3, constructed in 1945, are within the Flightline Historic District. Hangar 15 was constructed in 1956; the Ammunition Storage Igloo and the Sentry Gate House were both built in 1962; and the Egress Shop was built in 1963.

The NRHP eligibility of the six unevaluated structures would need to be determined prior to demolition or exterior renovation. Option C has the potential to impact historic properties if SHPO consultation determines that exterior renovations to Hangar 16 would affect this NRHP-eligible structure, or if any of the other structures are eligible for the NRHP and exterior renovations would affect their eligibility.

While there are no recorded archaeological resources in the areas of the proposed FTE development or Flight Simulator and Field Training Detachment facilities, the areas have never been surveyed for archaeological resources (Air Force 2003b). If ground disturbing activities encountered previously unknown and unevaluated cultural resources, and if they were determined to be eligible for the NRHP, then impacts to archaeological resources could occur under Option C.

3.7.3.4 No Action

Under the No Action Alternative, the F-22A would not be beddown at Elmendorf AFB. Construction associated with the beddown would not occur and impacts to cultural resources would not be expected under this alternative. In all cases, resources would continue to be managed in compliance with federal law and Air Force regulation.

3.8 Land Use and Transportation

3.8.1 Definition of Elmendorf AFB Land Use and Transportation

The attributes of Elmendorf AFB and nearby land use addressed in this analysis include general land use patterns, land ownership, land management plans, and applicable plans and ordinances. General land use patterns characterize the types of uses within a particular area including human land uses, such as agricultural, residential, commercial, industrial, institutional, and recreational, or natural land uses, such as forests, refuges, and other open spaces. Land ownership is a categorization of land according to type of owner; the major land ownership categories associated with Elmendorf AFB include federal and state with nearby private and Alaska Native properties. Land use plans and ordinances, policies, and guidelines establish appropriate goals for future use or regulate allowed uses.

Transportation resources include the infrastructure required for the movement of people, materials, and goods. For this analysis, transportation resources include roads and the railway.

3.8.2 Existing Conditions

Elmendorf AFB is located at the head of Cook Inlet within the municipality of Anchorage. The installation comprises 13,455 acres of federal land directly north of the municipality of Anchorage in the southcentral portion of the state of Alaska.

Elmendorf AFB Land Use. Figure 3.8-1 depicts existing land uses for Elmendorf AFB. The airfield and related operation function are located in the center and southern part of the base. A variety of other land uses may be found along the southern portion of the base. A large industrial area forms a boundary between the central mixed-use core of the base and the housing and services area in the base's southwest corner. Medical facilities are located in the southeast corner, along with some housing and recreational areas. Large recreational and open space areas are also located north of the airfield (Air Force 2005d). Restricted Use Areas have been designated to prohibit construction of manned facilities in areas that were previously contaminated.

THE SOUTHWEST CORNER OF THE BASE HAS HOUSING DEVELOPMENTS, COMMUNITY SERVICES, AND OFFICES.

The base is bordered by U.S. Army Fort Richardson to the east. There are various training ranges within the military installations, including maneuver areas, impact areas, and training areas. To the west of Elmendorf AFB are the Port of Anchorage and Cook Inlet/Knik Arm. The city of Anchorage borders the base to the south. Privately held lands in the vicinity of the base are located primarily south and southeast of the base (Air Force 2001a). This includes a residential neighborhood known as Mountain View. Mountain View Elementary School is located on the north side of McPhee Avenue that runs along the southern boundary of Elmendorf AFB.

The base adopted a General Plan in April 2005 that presents a comprehensive planning strategy to support military missions assigned to the installation and guide future installation development decisions. With a 50 year horizon, the plan presents a summary of existing conditions and provides a framework for programming, design and construction, as well as resource management. The future land use plan depicts opportunities for a more functional grouping of land use types through the use of focus areas. Specifically, the plan recommends a FTE Focus Area on the east side of the north-south runway. This area would enable development of all the necessary facilities and infrastructure associated with the beddown of fighter aircraft (Air Force 2005d).

Base plans and studies present factors affecting both on- and off base land use and include recommendations to assist on-base officials and local community leaders in ensuring compatible development in the vicinity of the base. In general, land use recommendations are made for areas affected by both the potential for aircraft accidents (refer to Section 3.3, Safety) and aircraft noise (refer to Section 3.2, Noise). There are safety zones defined for each end of the runway based on the analysis of historic mishap data that defines where most aircraft accidents occur. Incompatible residential uses in the community of Mountain View exist within the safety zones at the end of Runway 16/34 (Air Force 2000b).

Noise contours in these plans are generated by the modeling program NOISEMAP. These noise contours are used to describe noise exposure around the base and support compatible land use recommendations. Noise is one of the major factors used in determining appropriate land uses since elevated sound levels are incompatible with certain land uses. When noise levels exceed an L_{dn} of 65 dB, residential land uses are normally considered incompatible. Noise exposure (depicted with contours) from operations occurring today at Elmendorf AFB are shown in Figure 3.2-1. These contours provide the baseline against which to measure the projected change should the F-22A be based at Elmendorf AFB.

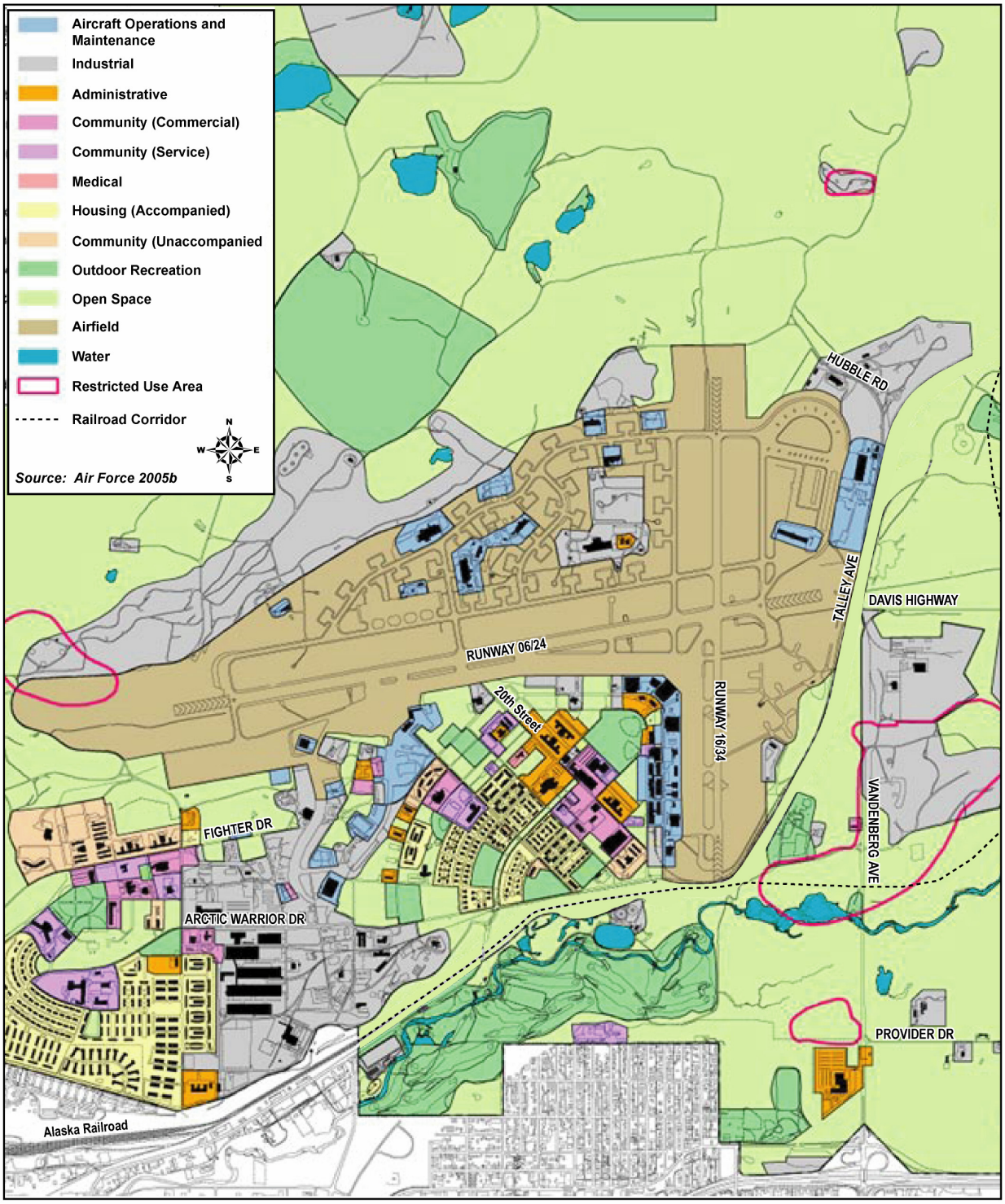


Figure 3.8-1. Elmendorf AFB Existing Land Use

Transportation. Elmendorf AFB is accessed by Davis Highway from Fort Richardson and Glenn Highway from the south. Vandenburg Avenue extends northward from the main gate (Boniface Gate) about 1.5 miles before intersecting Davis Highway which extends eastward to Fort Richardson.

Roads on Elmendorf AFB form a network independent from vicinity roads (refer to Figure 3.8-2). Access on and off the base occur through four gates on the south side (Boniface, Muldoon, Post Road, and Government Hill), and one access from Fort Richardson. Vehicular traffic is permitted on most base streets; restricted access may occur for operational or security reasons.

Primary roadways on Elmendorf include Davis Highway and Post Road. The former serves the eastern portion of the base and provides primary access to Fort Richardson. Provider Drive, which connects to the Glenn Highway, also provides important access to the southeast corner of the base including the hospital. Secondary roadways include Airlifter Drive, Fighter Drive, and Arctic Warrior Drive. The latter provides access from the west side of the base to the FTE area. The FTE area is also accessed by Vandenberg Avenue and the Davis Highway.

The rail line is located in the south and east portions of Elmendorf AFB (refer to Figure 3.8-2). The tracks have been relocated to the east to avoid security and safety hazards. The tracks are within the right of way and belong to the Alaska Railroad Company. All other tracks on the base are owned by the Air Force (Air Force 2004a).

THE RAIL LINE HAS BEEN RELOCATED TO THE EAST FROM THIS PHOTOGRAPHED LOCATION FOR SAFETY AND SECURITY REASONS.

3.8.3 Environmental Consequences

As described in Chapter 2.0, the key elements of the proposal are flight activities, facility construction, and personnel changes. Established and recognized noise models have been applied to estimate the off base and on base noise conditions. These models are described in Appendix D. For the land use and transportation resources, consequences are associated with increases in noise due to an increase in sorties or change in aircraft capability. Potential effects to land use plans, land use patterns and circulation due to construction or personnel increases are considered.

3.8.3.1 Option A

Under Option A, the total geographic area exposed to Ldn 65 or more would be approximately 9.5 percent less than under current conditions. The area affected by noise anticipated under this option is presented on Figure 3.2-1. This area includes a portion of the Knik Arm, a portion of the Port of Anchorage, and a portion of the Port MacKenzie area across the Knik Arm. Some areas on base would experience higher noise levels. These changes in the noise environment should not result in changes to land management, land use, or land ownership.

The DoD and FAA adopted the concept of land use compatibility as an accepted measure of aircraft noise effect. USEPA has reaffirmed these concepts (see Section 3.2.3). The FAA has guidelines that establish the best means for determining noise impact in airport communities. Industrial land uses, such as ports, are compatible within the 65 dB noise contours.

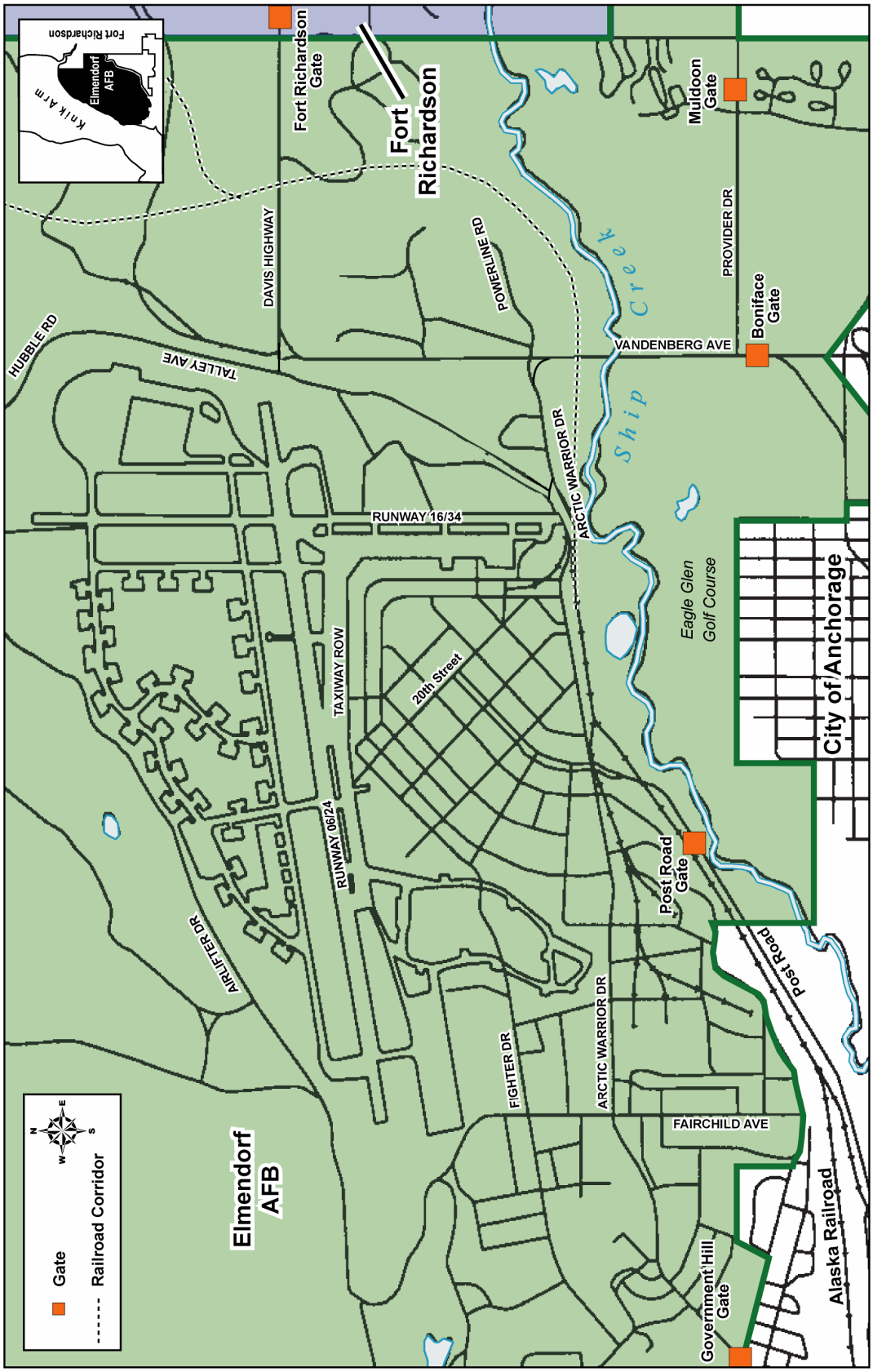


Figure 3.8-2. Elmendorf AFB Roads

The Elmendorf AFB noise abatement program precludes flight operations between 10 p.m. and 7 a.m. except for national emergency or infrequent large scale exercises. This program reduces the potential for noise impacts upon land uses and helps define the 65 dB contours. Although the F-22A operations will produce some increase in noise exposure within the base boundaries and over compatible land uses, that increase should not result in changes to land use or land ownership.

Proposed facility and infrastructure construction is consistent with the current Base General Plan, as it is proposed for the FTE Focus Area. No changes to the safety zones are anticipated under the Proposed Action. The incompatible land use in Mountain View would continue.

A comparison of Figure 3.8-1 and the potential development areas in Figure 1.1-1 demonstrates that FTE is adjacent to and outside of the restricted use area identified in Figure 3.8-1.

A 7.9 percent decrease in on-base employment is likely to reduce vehicle trips in the long term. Increased traffic during construction would contribute to increased congestion at gates and in the processing of access passes. Commuters to and from the installation during the morning and evening peak travel periods would be expected to face increased traffic during the 2007-2010 period. The short-term increase and long-term reduction in traffic are not likely to substantially affect commute times; however, adjacent intersections and access gates may experience increased congestion during construction.

3.8.3.2 Option B

Under Option B, the number of annual sorties would be the same as those described in Option A; thus, the noise effects are identical. Land use consequences are the same as those described for Option A.

Option B includes a variation on the construction, renovation, and infrastructure improvement projects. There could be minor changes in construction traffic, but the traffic consequences would be basically as described for Option A. Option B is consistent with the General Plan. Personnel changes are identical to those described in Option A.

3.8.3.3 Option C

Option C is identical to Option A for flight activities and personnel changes. However, Option C presents a variation on facility construction that uses and/or modifies facilities vacated by the BRAC relocation of F-15C and F-15E aircraft. New F-22A facilities would be constructed in the FTE area, but aircraft beddown locations would be spilt into three areas and away from existing maintenance facilities. Traffic patterns would not be expected to be substantially different from the discussion under Option A, although the three locations would distribute construction traffic more under Option C than under the other options. Option C varies from the Base General Plan's Focus Area concept, but is consistent with the functional grouping of land uses.

3.8.3.4 No Action

Under the No Action Alternative, F-22A aircraft would not be assigned to Elmendorf AFB at this time. F-15C and F-15E aircraft would continue to operate until BRAC schedules were resolved. Consequently, there would be no change to the noise environment and no F-22A related facility construction or personnel changes would occur.

3.9 Socioeconomics

Socioeconomic factors are defined as the basic attributes and resources associated with the human environment. The relevant factors related to the proposed F-22A beddown at Elmendorf AFB include:

- Population and housing
- Economic activity
- Public services

Data for the socioeconomic analysis in this EA were obtained from a variety of sources, including the Air Force, the U.S. Bureau of the Census, the U.S. Bureau of Economic Analysis, the Alaska Departments of Commerce and Labor, and the Municipality of Anchorage.

3.9.1 Definition of Elmendorf AFB Socioeconomics

Elmendorf AFB is situated in south-central Alaska, just north of Anchorage. Socioeconomic activities associated with the base are concentrated in the Municipality of Anchorage, which comprises the ROI for this analysis. Available socioeconomic characteristics are addressed for the base population and for the Municipality of Anchorage.

3.9.2 Existing Conditions

3.9.2.1 Population and Housing

The population of 18,000 individuals associated with Elmendorf AFB is comprised of 6,500 military personnel, 9,600 military family members, and 1,900 civilian employees (Air Force 2005e). Approximately 7,000 military personnel and their family members reside in on-base housing, including personnel living in privatized housing. Recent private sector on-base housing initiatives have improved housing for Elmendorf and Fort Richardson personnel. The remaining base employees and their families primarily reside within the Municipality of Anchorage, including the communities of Chugiak and Eagle River.

The 2003 population of the Municipality of Anchorage was 270,951 persons. This is an increase between 1990 and 2000 of an average annual rate of 1.4 percent. Population in the municipality is projected to increase at an average annual rate of 0.9 percent to 308,144 persons by the year 2018 (Alaska Department of Labor 1998). Anchorage is the largest city in Alaska, accounting for over 40 percent of the state population. The average household size in the municipality is 2.67 persons. Almost 95 percent of the 100,000 housing units are occupied, yielding a relatively low vacancy rate of 5.5 percent. By comparison, the vacancy rate statewide is 15.1 percent, primarily due to seasonal occupancy.

3.9.2.2 Economic Activity

Elmendorf AFB makes an important contribution to the Anchorage economy through employment of military and civilian personnel and expenditures for goods and services from local businesses. Elmendorf AFB's annual payroll obligates $481 million to its military and civilian employees. In FY 2005, the Air Force contributed an estimated $272 million in construction and service contracts and other purchases from local businesses. Elmendorf AFB has a total annual economic impact on the regional economy of over $880 million, supporting 3,060 secondary jobs and generating $128 million in annual secondary income (Air Force 2005e).

Anchorage is the center of commerce for the state of Alaska, an economy driven by four major sectors: oil/gas, military, transportation, and tourism. These sectors have provided a level of stability to the region and contributed to 15 consecutive years of economic growth. A number of industries are headquartered in Anchorage, including oil and gas enterprises, finance and real estate, transportation, communications, and government agencies.

While the unemployment rate is generally low, there are seasonal fluctuations related to resource usage, including commercial fishing and processing activities. Average unemployment in Anchorage was 5.7 percent in 2003, fluctuating between 4.1 percent and 7.4 percent during the period from 1990-2000. In the Anchorage region, total full- and part-time employment increased from 157,120 jobs in 1990 to 188,885 jobs in 2003, at an average annual rate of 1.4 percent (U.S. Bureau of Economic Analysis 2005). The largest employment sectors are government (21.6 percent), retail trade (11.3 percent), and health care and social services (10.6 percent). The military accounts for 11,527 jobs in Anchorage, representing 28.3 percent of government employment and 6.1 percent of total employment. Military employment has steadily declined as a percentage of the region from 11.0 percent of total employment in 1980, to 8.5 percent in 1990, to the current 6.1 percent.

3.9.2.3 Public Services

Daily operation of Elmendorf AFB, and furnishing of services and support to base personnel and family members, is the responsibility of the 3 WG, the base host unit. Off base public services are provided by a number of public and private entities. Police and fire protection services are provided by the Anchorage Police and Fire Departments, respectively. Anchorage Regional Hospital and various medical care providers offer health services in the area. The 3rd Medical Group in collaboration with the Veterans Administration provides hospital and medical care on Elmendorf AFB.

The Anchorage school district serves the Elmendorf AFB population, including three elementary schools, one middle school, and one high school. Elmendorf AFB provides youth programs, teen centers, and childcare services for military families residing and working on base.

3.9.3 Environmental Consequences

Existing population and employment characteristics in Anchorage were analyzed to assess the potential socioeconomic impacts of the proposed beddown, as presented in Section 3.9.2. The Proposed Action, described in detail in Chapter 2.0, involves two factors that may affect socioeconomic resources: personnel changes and facility modification. The anticipated net change in base employment amounts to a decline of 669 personnel under any option. Facility modifications associated with the F-22A beddown consist of a series of construction, renovation, and infrastructure improvement projects of approximately five years.

Socioeconomic impacts would occur if changes associated with the options substantially affected demand for housing or community services, such as schools, or substantially affected economic stability in the region. For each option described below, the potential population, employment, income, and output impacts are estimated and quantified to determine their potential effect on the region.

3.9.3.1 Option A

Construction Impacts

Under Option A, a total of 19 construction, renovation, or infrastructure improvement projects would be implemented over the period from 2006 to 2009. Total estimated cost of facility requirements under this option is $402 million (see Table 3.9-1). Potential direct impacts are estimated to include 1,904 construction jobs over the entire construction period and $102 million in direct earnings. The total socioeconomic impact of the proposed construction projects amount to an estimated $497 million in total economic activity, generating 4,030 total jobs and total earnings of $156 million. It is estimated that 10 percent of the needed workforce may temporarily relocate and take up residency in the region. Population impacts associated with construction may yield as many as 100 in-migrating residents each year of the construction period, a population increase of less than 0.1 percent. These potential impacts would be temporary, however, only occurring for the duration of the construction period. No permanent or long-lasting socioeconomic impacts are associated with construction under Option A.

Table 3.9-1. Construction-Related Economic Impacts

		Direct Impacts		Total Impacts		
	Estimated Cost	*Jobs*	*Income*	*Jobs*	*Income*	*Output*
Option A	$402,000,000	1,904	$102,400,000	4,030	$156,200,000	$497,300,000
Option B	$323,000,000	1,526	$82,100,000	3,230	$125,100,000	$472,800,000
Option C	$325,000,000	1,536	$82,600,000	3,250	$125,900,000	$475,800,000

Operational Impacts

Beddown of the F-22A Operational Wing would require personnel to operate and maintain the aircraft and provide necessary support services. Because the F-22A incorporates advanced computer checks and different maintenance, fewer personnel would be needed for the F-22A squadron than for the equivalent F-15C and F-15E squadrons. Total personnel under Option A would be reduced by a net of 669 positions. This is comprised of a reduction of 36 officers and 759 enlisted personnel partially offset by a gain of 126 civilian positions. This reduction would represent approximately 7.9 percent of the base employment. On average, this would reflect a payroll reduction of $40.4 million. The reduction in base employment would have a secondary effect of reducing 223 off base positions currently supported by this portion of associated base payroll.

It is estimated that 70 percent of departing military personnel would have family members, while the remaining 30 percent are unaccompanied. Based on the average family size of active duty personnel at Elmendorf AFB, an estimated 697 family members would depart, for a total anticipated population decline of 1,366 persons. A decrease of this size represents 7.4 percent of the Elmendorf AFB base-related population and 0.5 percent of the Anchorage population. Elmendorf AFB is a dynamic installation with regular changes in missions and personnel. The proposed change in base employment is not expected to be noticed in the overall base dynamics.

The Air Force makes on-base housing vacated by departing personnel available for military personnel residing off base. If 70 percent of the departing military personnel have a housing unit and the remainder share a unit with another military person, an estimated 570 off base

units would be vacated by this reduction in personnel. This would represent approximately 0.5 percent of housing in the Municipality of Anchorage. Since this personnel reduction would occur over several years in a dynamic large community, this change is not likely to be noticed.

3.9.3.2 Option B

Construction Impacts

Under Option B, a total of 17 construction, renovation, or infrastructure improvement projects would be implemented over the period from 2006 to 2009. Total estimated cost of facility requirements under this option is $323 million (see Table 3.9-1). Potential direct impacts are estimated to include 1,526 construction jobs over the entire construction period and $82 million in direct earnings. The total socioeconomic impact of the proposed construction projects amount to an estimated $473 million in total economic activity, generating 3,230 total jobs and total earnings of $125 million. It is estimated that 10 percent of the needed workforce may temporarily relocate and take up residency in the region. Population impacts associated with construction may yield as many as 100 in-migrating residents each year of the construction period, a population increase of less than 0.1 percent. These potential impacts would be temporary, however, only occurring for the duration of the construction period. No permanent or long-lasting socioeconomic impacts are associated with construction under Option B.

Operational Impacts

Operational impacts under Option B would be the same as under Option A. Beddown of the F-22A Operational Wing would require personnel to operate and maintain the aircraft and provide necessary support services. Population, payroll, and housing consequences would be as described for Option A. A decrease over several years of 7.4 percent of the Elmendorf AFB base-related population and 0.5 percent of the Anchorage population would not be expected to be noticed in the Municipality of Anchorage.

3.9.3.3 Option C

Construction Impacts

Under Option C, a total of 18 construction, renovation, or infrastructure improvement projects would be implemented over the period from 2006 to 2009. Total estimated cost of facility requirements under this option is $325 million (see Table 3.9-1). Potential direct impacts are estimated to include 1,536 construction jobs over the entire construction period and $83 million in direct earnings. The total socioeconomic impact of the proposed construction projects amount to an estimated $476 million in total economic activity, generating 3,250 total jobs and total earnings of $126 million. It is estimated that 10 percent of the needed workforce may temporarily relocate and take up residency in the region. Population impacts associated with construction may yield as many as 100 in-migrating residents each year of the construction period, a population increase of less than 0.1 percent. These potential impacts would be temporary, however, only occurring for the duration of the construction period. No permanent or long-lasting socioeconomic impacts are associated with construction under Option C.

Operational Impacts

Operational impacts under Option C would be the same as described for Option A for population, payroll, and housing. Total personnel under Option C would be reduced by 669 positions and an estimated 697 family members would also depart. A decrease of 7.4 percent of

the Elmendorf AFB base-related population would be approximately 0.5 percent of the Anchorage population.

3.9.3.4 No Action

Under the No Action Alternative, no beddown of the Second F-22A Operational Wing would occur at Elmendorf AFB at this time. The proposed facility modifications and personnel changes would not take place; therefore no socioeconomic effects associated with the F-22A would be anticipated.

3.10 Environmental Justice

EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, directs federal agencies to address environmental and human health conditions in minority and low-income communities. In addition to environmental justice issues are concerns pursuant to EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, which directs federal agencies to identify and assess environmental health and safety risks that may disproportionately affect children.

For purposes of this analysis, minority, low-income and youth populations are defined as follows:

- *Minority Population*: Alaska Natives, persons of Hispanic origin of any race, Blacks, American Indians, Asians, or Pacific Islanders.
- *Low-Income Population*: Persons living below the poverty level.
- *Youth Population*: Children under the age of 18 years.

Estimates of these three population categories were developed based on data from the U.S. Bureau of the Census. The census does not report minority population, per se, but reports population by race and by ethnic origin. These data were used to estimate minority populations potentially affected by implementation of the Proposed Action. Low-income and youth population figures also were drawn from the Census 2000 Profile of General Demographic Characteristics.

3.10.1 Definition of Elmendorf AFB Environmental Justice

Elmendorf AFB is situated in south-central Alaska, just north of Anchorage. Socioeconomic activities associated with the base are concentrated in the Municipality of Anchorage, which comprises the ROI for this analysis. Environmental Justice characteristics are addressed for the base population, when available, and for the Municipality of Anchorage. In addition, the area of land situated outside the Elmendorf AFB boundaries but within the new 65 L_{dn} noise contour is addressed. The two affected geographic areas comprise a total 31.3 acres and, due to their industrial and rural nature, do not have permanent residents within the 65 dB contours.

3.10.2 Existing Conditions

To comply with EO 12898, ethnicity and poverty status in the vicinity of Elmendorf AFB were examined and compared to state and national data. Minority persons represent 30.1 percent of the Municipality of Anchorage population (U.S. Bureau of the Census 2000a). Alaska Natives account for most of the minority population in Anchorage, representing 7.0 percent of the total population and 23.4 percent of the minority population. By comparison, minority persons

represent 32.4 percent of the state population, with Alaska Native accounting for 47.5 percent of the state minority population.

The incidence of persons and families in the Municipality of Anchorage with incomes below the poverty level was comparable to state levels. In Anchorage during 2000, 7.3 percent of persons were living below the poverty level, compared to 9.4 percent of persons in the state and 12.4 percent of persons in the nation (U.S. Census 2005).

To comply with EO 13045, the number of children under age 18 was determined for the vicinity of Elmendorf AFB and compared to state and national levels. In 2000, there were 75,742 children age 17 and under residing in Anchorage, comprising 29.1 percent of the population. This compares to 30.4 percent for the State of Alaska and 25.7 percent for the nation.

3.10.3 Environmental Consequences

Disadvantaged groups within the general vicinity of Elmendorf AFB, including minority, low-income and youth populations, do not represent a disproportionate segment of the population. The flight activity, facility modifications and personnel changes associated with the Proposed Action options are not expected to create significantly adverse environmental or health effects.

3.10.3.1 Option A

No residential land or minority or disadvantaged populations would be under the projected 65 dB noise contour. The reduction in long-term employment and the short-term increase in construction employment are not expected to disproportionately affect disadvantaged populations. There would be no disproportionate impact upon children. No adverse health or safety risks to children are anticipated as a result of implementation of Option A.

3.10.3.2 Option B

Potential effects to minority, low-income populations, or youth would be the same as those described under Option A.

3.10.3.3 Option C

Potential effects to minority, low-income populations, or youth would be the same as those described under Option A.

3.10.3.4 No Action

Under the No Action alternative, no changes in flight activity, noise contours, facilities, or personnel are anticipated. No impacts to disadvantaged or youth populations would occur.